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AVIATION SAFETY: CAN NASA DO MORE TO PROTECT THE PUBLIC?

HEARING

BEFORE THE

COMMITTEE ON SCIENCE AND TECHNOLOGY

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

OCTOBER 31, 2007

Serial No. 110–70

Printed for the use of the Committee on Science and Technology

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AVIATION SAFETY: CAN NASA DO MORE TO PROTECT THE PUBLIC?

WEDNESDAY, OCTOBER 31, 2007

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, DC.

The Committee met, pursuant to call, at 1:35 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Chairman of the Committee] presiding.

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE & TECHNOLOGY

Hearing on

Aviation Safety: Can NASA Do More to Protect the Public?

Wednesday, October 31, 2007
1:30 p.m. - 3:30 p.m.
2318 Rayburn House Office Building

WITNESS LIST

Panel 1

Dr. Michael Griffin
Administrator
NASA

Mr. Jim Hall
Managing Partner, Hall and Associates LLC and
Former Chairman, National Transportation Safety Board (NTSB)

Panel 2

Dr. Robert S. Dodd
Safety Consultant and President
Dodd & Associates LLC

Dr. Jon A. Krosnick
Frederic O. Glover Professor in Humanities and Social Sciences
Stanford University

Captain Terry McVenes
Executive Air Safety Chairman
Air Line Pilots Association

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HEARING CHARTER

COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

Aviation Safety: Can NASA Do More to Protect the Public?

WEDNESDAY, OCTOBER 31, 2007
1:30 P.M.–3:30 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

Purpose

The Committee will hold a hearing on NASA policy regarding the agency's management of the National Aviation Operations Monitoring Service (NAOMS). NAOMS has been in the press due to NASA's refusal to release the data to an Associated Press (AP) reporter, offering the rationale that release of the information might undermine the flying public's confidence in the aviation system because it relates to safety. NASA's refusal to release this data has been widely condemned in the Nation's press with editorials in many papers. NASA's Administrator Michael Griffin has formally distanced himself from that rationale, but he has not yet made it clear when or even whether NASA will publicly release this data.

Witnesses

Panel 1

Dr. Michael Griffin, Administrator, National Aeronautics and Space Administration (NASA)

Mr. Jim Hall, Managing Partner, Hall and Associates, LLC, and Former Chairman, National Transportation Safety Board (NTSB)

Panel 2

Dr. Robert S. Dodd, Safety Consultant and President, Dodd & Associates, LLC

Dr. Jon A. Krosnick, Frederic O. Glover Professor in Humanities and Social Sciences, Stanford University

Captain Terry McVenes, Executive Air Safety Chairman, Air Line Pilots Association

Background

On October 29, Administrator Griffin sent a letter to the Committee indicating that the data was being provided to the Committee, but noting that "NASA believes that the data contains both confidential commercial data and information that could compromise anonymity that should be redacted prior to public release." Staff have been unable to find a NASA or Battelle staffer [the contractor on the project] who can articulate what commercially sensitive information resides in these data bases. As to anonymity, Battelle indicated that all personal identifying information was stripped away from the data within 24 hours of conducting a survey. It is unclear what data should be removed prior to public release and this may be a question for NASA.

The concern NASA has expressed in its initial FOIA rejection letter was that public release of the data may undermine confidence in flying among the public. However, other data safety systems are already open to the public and include plenty of details that could have far more impact on public confidence than data contained in a spreadsheet. The best known is the Aviation Safety Reporting System (ASRS) which includes numerous stories about near misses in the air and on the ground. The bottom line is that when planes have actually crashed, people keep going right to the airport. The Committee asked NASA to provide all records of the aviation industry expressing concerns that their commercial interests could be damaged or objecting to the impact on the flying public's attitudes if NAOMS data were made publicly available, and NASA could find no responsive records.

In addition to the FOIA issue, the hearing will provide an opportunity for the Committee to learn about aviation safety data sources and the rationale behind launching NAOMS in the first place. All other data systems involve voluntary self-reporting tied to either incidents that have happened or else data that has been filtered by private parties to strip information out of the report prior to being turned over to the government. FAA collects most of these data sources; NASA manages the Aviation Safety Reporting System (ASRS) for FAA. If it had been rolled out operationally, NAOMS would have integrated continuous survey data from pilots, ground controllers, ground crews, and cabin crews to create a complete picture of what is happening in the air safety system nationally. This information would not be driven by adverse events and would have a statistical rigor that the self-reporting anecdotal systems lack. As a result, safety experts could mine the NAOMS data for insights into new safety threats as they emerge.

The aviation system is changing due to new information and communications technologies that are being introduced into the system. It is also anticipated that the national airspace system will have to handle up to three times as much demand by 2025 compared to 2000. The voluntary reporting systems of the past may not be good enough, and certainly do not represent what could be achieved with improved data systems, to keep the skies over the United States safe. NAOMS was to be that pro-active, forward looking tool to identify problems tied to increasing demands on capacity and unexpected problems with the introduction of new technologies.

NASA spent three years developing and field testing the NAOMS survey with support by Battelle and several distinguished subcontractors who were experts in survey methodology or aviation safety. Then NASA ran a survey of commercial pilots for almost four years. Over 24,000 pilots responded to the survey. Another 4000 general aviation pilots were surveyed during a span of several months over 2002–2003. The contractor also began work to roll out a survey of air traffic controllers, but it was never implemented in the field. After spending more than $8 million to develop this tool and begin to put it in place, NASA shut it down before it became operational. The project enjoyed unusual success in gathering responses from pilots, but the project also ran up against competing priorities within the agency, as well as a lack of interest at the FAA.

In shutting the project down, NASA has done absolutely nothing to either advertise the methodology and the goal they hoped to achieve or release any analytical products that give insights into air safety trends. This was true until the AP reporter pushed to get the materials out. Only then did the top managers for this project at NASA begin to try to put some sort of report together. NASA says a technical report will be released by the end of the year, but prior to a week ago, the report was described by both NASA counsel and NASA researchers to Committee staff as something that would represent analytical insights drawn from the data with recommendations for improving air safety. It appears that NASA has moved the goal posts even on this belated work product.

The reasons that NAOMS was needed have not changed. The national air transportation system appears safe at the moment, but new technologies and stresses will produce exactly the situation that NAOMS was designed to help address.

To help the Committee sort through some of this, we will receive testimony from **Dr. Michael Griffin,** the NASA Administrator. The Committee will also take testimony from **Mr. Jim Hall** (former head of the National Transportation Safety Board and member of the 1997 Aviation Safety and Security Commission—the Gore Commission), **Dr. Robert Dodd** (aviation safety expert who managed the NAOMS project under contract to Battelle), **Dr. Jon Krosnik** (Stanford statistics professor who helped design the survey), and a representative of the Airline Pilots Association (ALPA), **Captain Terry McVenes.** ALPA actually opposes release of the raw data, but they do favor analysis of that information. NASA has also “handed-off” the NAOMS methodology to ALPA (though it has been redesigned as a web-based, not phone-based survey) so that they can administer the survey to their members. However, ALPA has told Committee staff that they have not decided what questions they would ask, who they would ask them of, or even when to run a survey. They have done nothing with NAOMS to date.

Chairman GORDON. I want to welcome all of you, and I especially want to welcome our witnesses to today's hearing. You have made yourself available to testify on relatively short notice, and I appreciate your willingness to assist the Committee in carrying out our oversight responsibilities on this important issue.

It was important that we met as soon as possible to get to the bottom of what has been going on and what NASA intends to do from this point forward. America's air transportation system is critical both to our nation's economic vitality and to our quality of life.

However, it is no secret that the system faces increasing stresses as air traffic demand continues to grow, demand that is expected to increase by a factor of two or three by the year 2025. And those stresses make it even more important that all necessary steps are taken to maintain air safety. It is the right thing to do, and the American public expects it.

Our citizens want to be sure that the government and the aviation industry are doing all that can be done to keep the air transportation system safe. That is why both the public and Members of Congress alike have such a strong reaction to reports that NASA has been withholding an aviation safety survey database compiled by taxpayer dollars. NASA's explanation for its refusal to release the data was both troubling and unconvincing.

Specifically, NASA has stated the data can't be released because, and I quote, "It could materially affect the public confidence in, and the commercial welfare of air carriers."

Well, as I have said before, NASA needs to focus on maintaining and increasing the safety of the flying public, not protecting the commercial air carriers. And if NASA accomplishes that and if we have a safe traveling environment, then the commercial air carriers, their situation will certainly be enhanced. Dr. Griffin has indicated that he agrees, and he will testify today that NASA will publicly release the NAOMS data.

While we need to clarify just exactly what will be released and when, and I hope it will be soon, I am pleased that he is taking that action, as his usual candor dictates. If scheduling this hearing helped bring about the change of direction at NASA, I think that it has been a constructive exercise by our oversight responsibilities.

However, the issue we have to consider today goes beyond simply the release of the data NASA is withholding. We also have a question of priorities. As former NTSB Chairman Jim Hall will testify, and again, I quote, "A true safety culture requires transparency and consistent vigilance."

Numerous individuals familiar with this report have told us that it has envisioned, was envisioned as a long-term, continuing data collection and analysis effort to identify aviation accident precursors and safety trends. And several of our witnesses today will testify that it has potential to provide information and insights unobtainable from existing data sources.

Therefore, by most accounts, the report appeared to be a promising avenue for ensuring that our nation's air transportation system would retain its impressive safety record in the coming years. Yet whether it was due to shifting priorities, budgetary constraints, cultural differences between agencies, or something else, the report has largely been cast adrift by NASA and the FAA.

I hope that one outcome of today's hearing will be the reconstruction of the report and project by NASA and the FAA. However, I think we in Congress also need to take a close look at NASA's overall aviation safety program to make sure that it still addresses the most relevant safety questions facing the Nation's air transportation system.

That is going to be one of the focuses of today's hearings and in the coming months. Maintaining and improving aviation safety is an important task for the Federal Government to accomplish, working in partnership with the aviation industry. The stakes are high, and we need to get it right.

We have a lot to do and to cover today, so I again welcome our witness at today's hearing, and I now yield to my good friend and colleague, Ranking Member Ralph Hall.

[The prepared statement of Chairman Gordon follows:]

PREPARED STATEMENT OF CHAIRMAN BART GORDON

Good afternoon. I'd like to welcome all of our witnesses to today's hearing. You have made yourselves available to testify on relatively short notice, and I appreciate your willingness to assist the Committee in carrying out our oversight on this important issue.

It was important that we meet as soon as possible to get to the bottom of what has been going on, and what NASA intends to do from this point forward. America's air transportation system is critical both to our nation's economic vitality and to our quality of life.

However, it's no secret that the system faces increasing stresses as air travel demand continues to grow—demand that is expected to increase by a factor of two to three by 2025. And those stresses make it even more important that all necessary steps are taken to maintain air safety. It's the right thing to do, and the American public expects it.

Our citizens want to be sure that the government and the aviation industry are doing all that can be done to keep the air transportation system safe. That's why both the public and Members of Congress alike had such a strong reaction to reports that NASA has been withholding an aviation safety survey data base compiled with taxpayer dollars. NASA's explanation for its refusal to release the data was both troubling and unconvincing.

Specifically, NASA was saying the data can't be released because it *"could materially affect the public confidence in, and the commercial welfare of the air carriers. . ."*

Well, as I've said before, NASA needs to focus on maintaining and increasing the safety of the flying public, not on protecting the commercial air carriers. Dr. Griffin has indicated that he agrees, and he will testify today that NASA will publicly release the NAOMS data.

While we need to clarify just exactly what will be released and when—and I hope it will be soon—I am pleased that he is taking that action. If scheduling this hearing helped bring about this change of direction at NASA, I think that it has been a constructive exercise of our oversight responsibilities.

However, the issues we have to consider today go beyond simply the release of the data NASA is withholding. We also have a question of priorities. As former NTSB Chairman Jim Hall will testify today: *"A true safety culture requires transparency and constant vigilance."*

Numerous individuals familiar with the NAOMS project have told us that it was envisioned as a long-term, continuing data collection and analysis effort to identify aviation accident precursors and safety trends. And several of our witnesses today will testify that it has the potential to provide information and insights unobtainable from existing data sources.

Thus, by most accounts, NAOMS appeared to be a promising avenue for ensuring that our nation's air transportation system would retain its impressive safety record in the coming years. Yet whether it was due to shifting priorities, budgetary constraints, cultural differences between agencies, or something else—NAOMS has largely been cast adrift by NASA and the FAA.

I hope that one outcome of today's hearing will be a reconsideration of the NAOMS project by NASA and the FAA. However, I think we in Congress also need to take a close look at NASA's overall aviation safety program to make sure that it is still addressing the most relevant safety questions facing the Nation's air transportation system.

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Maintaining and improving aviation safety is an important task for the Federal Government to accomplish—working in partnership with the aviation industry.

The stakes are high, and we need to get it right.

We have a lot to cover today, so I again want to welcome our witnesses to today's hearing, and I now yield to my good friend and colleague, Ranking Member Ralph Hall.

Mr. HALL OF TEXAS. Mr. Chairman, I thank you and today's hearing on NASA's National Aviation Operations Monitoring Service, NAOMS, is a timely hearing, especially considering the amount of scrutiny this program has received in the press. Several issues have arisen that bring into question the manner in which NASA closed out NAOMS, whether it achieved its original goals and the agency's refusal to provide raw survey data to the press in response to a *Freedom of Information Act* request. I am optimistic that by the hearing's conclusion and we hear these very capable men and women, if there are any on here, that we will have a clear understanding regarding these and other pressing issues.

And I do want to associate myself with NASA Administrator Mike Griffin's public statement that lays out the agency's philosophy on the treatment of research data. Like him, I believe NASA ought to be in the business of putting information in front of the public, not withholding it. That being said every care should be taken to protect the identities of survey respondents. NAOMS has promised pilots complete confidentiality to ensure their candid participation, and most folks believe that ought not to be breached.

If information is disclosed that may allow respondents to be identified, there will be a serious chilling effect in future survey efforts funded by the Federal Government, whether we are talking about pilots or other citizen groups who provide our government meaningful insight into a whole host of activities. In the case of NAOMS, we should be cognizant of striking a balance between transparency and confidentiality.

I have the greatest faith in the Administrator. I have been through half a dozen or so administrators since I have been up here, and I think there is none surpasses him in background, ability. He is a pilot, he is young, he is agile, and he is a lot of other things that are good for NASA. And I am just really proud of him and honored to have him come before this committee.

NASA should release the data, but, you know, to help us all gain a better understanding of what it is telling us, they ought to provide information, whether in the form of analysis, methodology, or reports, to give us a clear sense of context. But it is also important that the data be scrubbed, I think, to ensure errors are omitted. Get the errors out of there.

I want to thank our witnesses for taking time from their busy schedules to appear before us this afternoon and acknowledge their hard work and preparation. All of us appreciate your willingness to be here, and Mr. Hall from Tennessee, we certainly well you and thank you, sir.

I yield back my time.

[The prepared statement of Mr. Hall of Texas follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL

Mr. Chairman, today's hearing on NASA's National Aviation Operations Monitoring Service (NAOMS) is timely, especially considering the amount of scrutiny this program has received in the press. Several issues have arisen that bring into question the manner in which NASA closed out NAOMS, whether it achieved its original goals, and the agency's refusal to provide raw survey data to the press in response to a *Freedom of Information Act* request. I am optimistic that, by the hearing's conclusion, we'll all have a clear understanding regarding these and other pressing issues.

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NASA should release the survey data, but to help all of us gain a better understanding of what it is telling us, they should also provide information, whether in the form of analysis, methodology, or reports, to give us a clear sense of context. It's also important that the data be scrubbed to ensure errors are eliminated.

I want to thank our witnesses for taking time from their busy schedules to appear before us this afternoon, and acknowledge their hard work and preparation. All of us appreciate your willingness to be here.

Thank you, Mr. Chairman.

Chairman GORDON. Thank you, Mr. Hall from Texas.

If there additional Members who wish to submit additional opening statements, your statements will be added to the record. Without objection, so ordered.

[The prepared statement of Mr. Udall follows:]

PREPARED STATEMENT OF CHAIRMAN MARK UDALL

Good afternoon. I am disappointed that we have had to convene today's hearing. But NASA's stated rationale for refusing to release publicly information from the taxpayer-funded National Aviation Operations Monitoring Service (NAOMS) aviation safety survey is unsupportable and required congressional scrutiny. The safety of the public has to be our first priority, especially with more and more Americans flying every year.

Specifically, in its response to the Associated Press's request for release of the NAOMS aviation safety survey data, NASA stated that: *"Release of the requested data, which are sensitive and safety-related could materially affect the public confidence in, and the commercial welfare of, the air carriers and general aviation companies whose pilots participated in the survey."*

NASA's response in effect seems to be saying that it sees its job as putting the commercial interests of the aviation industry above the public's right to aviation safety information.

That response is unacceptable. It's certainly not in accordance with the *National Aeronautics and Space Act of 1958,* which created NASA and established objectives for the agency—one of which is *"the improvement of the usefulness performance, speed,* **safety,** *and efficiency of aeronautical and space vehicles,"* while directing NASA to operate in a manner that will *"provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."*

The NASA Administrator has since distanced himself from the language in NASA's response to the FOIA request, saying that he regrets *"the impression that NASA was in any way trying to put commercial interests ahead of public safety. That was not and will never be the case."*

I'd like to hear the Administrator reiterate that stance at today's hearing. And although I am glad that he has now agreed to release at least some of the NAOMS data publicly so that it can be used to help maintain and hopefully improve the safety of the Nation's airways, I feel strongly that **all** the NAOMS data should be made publicly available as soon as possible.

I intend to be vigilant to ensure that this release actually occurs in a timely manner.

Former National Traffic Safety Board Chairman Jim Hall, who is one of our witnesses today, got it right in his prepared testimony when he wrote that *"It is difficult to overemphasize the importance of transparency and accountability in aviation. It is the single greatest reason why you are so safe when you get on an airplane today."* I wholeheartedly agree. We need to work hard to expand that transparency and accountability—not restrict it. And that is why all the information from the study must be released—and soon.

Yet, the struggle over the fate of the NAOMS data is not the only issue that needs attention at today's hearing. We also need to decide where we should go from here. We will hear from a number of witnesses here today about the value of a comprehensive, ongoing survey and analysis approach to aviation safety trend analysis and accident precursor identification—the approach exemplified by the NAOMS project.

As Chairman of the Space and Aeronautics Subcommittee, I have oversight responsibility for both NASA's aeronautics and aviation R&D programs and FAA's aviation R&D programs.

I intend to make sure that the government is taking all necessary steps to have the aviation safety data sources and analysis tools that will be needed to maintain air safety in the coming years.

Based on testimony we will hear today, there appears to be a great deal of merit to the NAOMS approach, and we need to assess whether NASA and FAA should reinstitute the project. Given its potential value and the modest amounts of funding required to make effective use of the NAOMS methodology relative to the more than $30 billion spent on NASA and FAA annually, I think the burden of proof should be on those who want to walk away from the investment made to date in the NAOMS project.

I am aware that a number of FAA officials have indicated that the FAA is not interested in NAOMS and would rather develop a new aviation safety information system combining data from multiple existing safety and performance data bases. Making as effective use as possible of existing data bases is a worthy objective, and one that quite frankly FAA should have been doing all along. However, FAA's own documentation states that it doesn't envision completing more than *"the Phase 1 pre-implementation activities, including concept definition"* for the proposed new combined Aviation Safety Information Analysis and Sharing (ASIAS) system until 2013 at the earliest.

That's an unacceptably long time to wait, when it appears that NASA and FAA could be generating useful safety trend and accident precursor information—which will help keep the flying public safe—from a restarted NAOMS initiative almost immediately.

It also doesn't address the question of whether NAOMS could provide additional valuable insights into the safety status and trends for the Nation's air transportation system beyond those available from existing data bases.

These issues go beyond what we are likely to have time to consider today, so I intend to have the Space and Aeronautics Subcommittee pursue them in the coming months.

Mr. Chairman, we can take pride in the overall safety record of America's air transportation system. However, we dare not rest on our laurels. We need to be vigilant to ensure that all is being done that should be done to maintain and improve that safety record—and the information gained from the taxpayer-funded NAOMS study is very important to our work. This hearing is an important step in meeting our safety oversight responsibilities, and I am glad we are holding it.

[The prepared statement of Mr. Feeney follows:]

PREPARED STATEMENT OF REPRESENTATIVE TOM FEENEY

When this hearing was first scheduled, allegations of cover up and document destruction swirled in the air. So I initially thought—how did the Science and Technology Committee obtain jurisdiction over Sandy Berger's escapades at the National Archives? Alas, that topic remains untouched.

Originally, the Full Committee was to spend today examining the environmental and safety aspects of nanotechnology—a timely and thoughtful topic given nanotechnology's current and future importance. Such a hearing would continue this committee's serious treatment of serious issues.

But like a cop on the beat, the powers-that-be have apparently given this committee a quota of "oversight" tickets to write. Infractions must be found and highlighted with great drama. So the nanotechnology hearing was relegated to a subcommittee and replaced with today's festivities. But to paraphrase Gertrude Stein, the trouble with today's hearing is that "when you get there, there isn't any there there."

Here's today's kerfuffle in a nutshell. Starting in fiscal year 1998, NASA funded a research project—the National Aviation Operations Monitoring Service (NAOMS)—that attempted to use telephone survey data to provide a representative picture of aviation system safety. Over eight years, $11.3 million (0.00867582 percent of NASA's budget over this period) was spent on this non-peer reviewed research.

Unfortunately, NAOMS failed to yield worthwhile information. Instead, it painted a picture of the aviation system with anomaly rates (such as engine failures) that bore no relationship with reality. It's as if the public were polled and the data suggested a 75 percent approval rate for today's Congress. Any politician would know that something was terribly wrong with that survey's methodology.

Four months ago, the Associated Press made a *Freedom of Information Act* (FOIA) request for the raw and rather stale data collected in the NAOMS study. NASA denied that request and used some inarticulate reasoning.

When this matter was brought to NASA Administrator Mike Griffin's attention, he promptly responded with his characteristic pattern of integrity, candor, and action. Griffin has vowed to bring openness and transparency to NASA. In that type of environment, participants feel empowered to acknowledge and address problems—a behavior that could have averted the *Challenger* and *Columbia* tragedies. Thus, Griffin promptly acknowledged that NASA should have better handled this FOIA request and vowed to correct the matter.

And so he has. Griffin has determined that this data should be released and will do so once confidential information is redacted (survey participants were promised confidentiality in return for their candor). Furthermore, he has cautioned about properly interpreting the data since the survey methodology appears to be quite flawed.

In the wake of the *Columbia* Accident Investigation Board's finding of a NASA culture discouraging openness and frankness, one would think Administrator Griffin would be commended for his leadership. After all, leaders set examples. Here he has promptly responded to a concern, acknowledged an error, and outlined corrective actions. Isn't this the type of conduct to be encouraged?

But that would deviate from today's script and ruin the planned drama. So like the abusive spouse who enjoys publicly brow-beating his partner, the Majority will undoubtedly pummel NASA's finest Administrator in recent memory. No acknowledgement of error or corrective action will satisfy the belittling and rampaging spouse.

Undoubtedly at another forum, today's inquisitors will bemoan how skilled, accomplished, and decent people eschew public service. Or how today's Congress avoids addressing issues of genuine concern to the governed.

[The prepared statement of Mr. Costello follows:]

Prepared Statement of Representative Jerry F. Costello

Mr. Chairman, I am pleased that the Committee is pursuing this issue, as the reports surrounding NASA's NAOMS program and it's refusal to release initial data have been troubling.

As Chairman of the Aviation Subcommittee of the Committee on Transportation and Infrastructure, I firmly believe that safety must be our top priority. As Ranking Member of the Subcommittee last Congress, I called for a comprehensive hearing on aviation safety and since becoming Chairman, I have held numerous subsequent hearings that have highlighted the importance of this issue.

What concerns me regarding NASA's handling of the NAOMS study is that regardless of the initial findings of the study, this information has the ability to help improve transportation safety, and that should be our priority, not the possible adverse affects the information may or may not have on the industry. In addition, this situation has been handled poorly by NASA, and it fits into a pattern of reluctance to release information—particularly regarding safety—and concerns that NASA officials are too close to, and too quick to protect, the interests of industry.

Again, Mr. Chairman, I'd like to commend you for calling this hearing, I am very interested in learning the findings of this study, and how we can use the information to help ensure the safety of all air travelers.

[The prepared statement of Mr. Miller follows:]

PREPARED STATEMENT OF REPRESENTATIVE BRAD MILLER

The purpose of today's hearing is to look at the National Aeronautics and Space Administration's (NASA) management of the National Aviation Operations Monitoring Service (NAOMS), and to examine how, in the absence of a system such as NAOMS, NASA plans on monitoring air safety in the future.

Every year more planes are in the air, and each year brings new challenges to aviation safety. The purpose of NAOMS was to identify problems with both increasing demand and the introduction of new technologies. Instead of reacting to aviation disasters NAOMS would have been able to identify emerging safety problems. The program appears to be a cost-effective and scientifically valid way of looking at airline safety. More important, I would like to know what NASA is going to do to ensure American's safety in the absence of NAOMS.

I am glad that NASA and Administrator Griffin have voiced a willingness to release the data gathered under the NAOMS project. Analysis of this data could be a key tool in understanding what is happening at US airports. I understand that there is some concern over the release of proprietary commercial data and the anonymity of survey participants. It is my strong hope that NASA will take realistic precautions to ensure anonymity, but not let that become an excuse not to release the data in a timely manner.

[The prepared statement of Mr. Lipinski follows:]

PREPARED STATEMENT OF REPRESENTATIVE DANIEL LIPINSKI

Thank you, Mr. Chairman.

This is a very timely subject and one that is extremely important to the residents of the 3rd District of Illinois. Chicago is a key national and international aviation hub and collaboration is key to ensuring the continued safety and vitality of the aviation industry. At Midway International Airport in my District, working collaboratively we brought new safety upgrades online which will greatly enhance the safety of the flying public and everyone who works at the airport. And through additional collaboration, such as the sharing of informative data findings from your report, we can work to further improve the safety of our nation's aviation industry.

This issue hits especially close to home for me. Many remember the tragic accident in 2005 when an aircraft skidded off the runway at Midway Airport into a passing car, killing a young boy. That is why, as a Member of the T&I Committee's Subcommittee on Aviation, I worked hard to incorporate necessary funding into this year's FAA reauthorization bill that will make our runways safer and increase aviation safety inspectors by more than one-third. I also sought to ensure the accelerated implementation of the Next Generation Air Transportation system, which will allow our air traffic control system to meet two to three times the amount of current demand and keep pace with the ever-increasing number of flights.

[The prepared statement of Mr. Mitchell follows:]

PREPARED STATEMENT OF REPRESENTATIVE HARRY E. MITCHELL

Thank you, Mr. Chairman.

Like most Americans, I was stunned last week to hear that NASA had refused to release the results of an $11 million survey of airline pilots on potential safety lapses in our nation's aviation network. . .because the information "could undermine public confidence in the airlines and could affect the airlines' profits."

The idea that the Federal Government would put private profits ahead of the flying public's safety is as outrageous and inexcusable.

The only thing more shocking about this awful decision is where it came from. We're talking about NASA—the agency that houses some of the best and brightest minds on Earth.

But it shouldn't take a rocket scientist to figure out that safety comes first.

Aviation is serious business in my district. One of the Nation's largest airlines is headquartered in Tempe, and Phoenix Sky Harbor is now the eighth busiest in the country. We depend on aviation. . .and we depend on the Federal Government to keep our skies safe.

NASA's survey reportedly contains information. . .from pilots. . .about runway incursions, wildlife strikes, and near collisions. These are real risks. If pilots have concerns about them, we need to know.

And if NASA wants to tell us that its survey methodology was flawed. . .and, therefore, the results of its survey are inconclusive. . .then we need to know how they were able to waste $11 million taxpayer dollars creating and conducting it.

Is it really asking too much for us to expect NASA to know a thing or two about scientific methodology?

The flying public deserves an explanation.

They deserve to know how this happened. . .but more importantly, what is being done to correct the situation, and what steps are being taken to ensure that something like this never happens again.

I look forward to hearing from our witnesses.

I yield back.

Chairman GORDON. At this time I would like to recognize our first panel. First we have Dr. Michael Griffin, who is the Administrator of the National Aeronautics and Space Administration, and I will concur with Mr. Hall's accolades, even the youthfulness. And we also have Mr. Jim Hall, who is a Managing Partner at Hall and Associates and is also the Former Chairman of the National Transportation and Safety Board. Welcome to you both.

And Chairman Griffin, we will begin with you or Director Griffin.

Panel 1:

STATEMENT OF DR. MICHAEL D. GRIFFIN, ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

Dr. GRIFFIN. Thank you, Mr. Gordon, Mr. Hall for your kind statements. I only wish I were still young, but, oh, well. It is all a matter of relativity here. Mr. Hall is my hero. He is still on the right side of the dais.

So, thank you, Mr. Chairman, Members of the Committee for the opportunity to appear here today to discuss aviation safety and the NAOMS Project. When I was made aware last week that a NAOMS pilot survey data had been withheld under *Freedom of Information Act* request initiated by the AP, I asked Dr. Lisa Porter, our AA for Aeronautics Research, to investigate the matter. And I hope to provide you with the information that will address the questions and the concerns that have been raised by you and others in the past several days.

Let me start by making three points clear up front. First, the survey results that we can legally release will be released. Period. Two, the contractor and NASA maintain master copies of all NAOMS survey results, and we have instructed the NAOMS project management team and the contractor, Battelle, to retain all records related to the project. Battelle provided the same direction to its subcontractors. Also, sir, your staff has this data.

Three, the NAOMS Project had from its inception a planned and finite duration. It was not terminated early. It was, in fact, extended, and it was not terminated early to provide funds for the Moon Mars Program or anything else.

Quite simply, the NAOMS Project began in 1998, with the goal of developing methods to facilitate a data-driven approach to aviation systems safety analysis. To accomplish this goal required the generation of data that are statistically meaningful and representative of the system. The NAOMS Project Team developed a survey methodology to acquire that data. The survey methodology development took about two years to complete.

The actual data collection using that methodology began in April of '01, and ended in December of '04. During that time the project team interviewed, surveyed approximately 24,000 commercial airline pilots and 5,000 general aviation pilots. In early '05, it was determined that the number of survey results collected were sufficient to evaluate whether the NAOMS survey methodology indeed produced statistically meaningful and representative data.

NASA's Aviation Safety and Security Program leadership then directed the NAOMS Project to complete the assessment of its survey methodology and transfer it to industry and government decision-makers and provided the FY 2005 funding to do that.

It is worth noting that the 2004 review of NASA's aerospace technology enterprise by the National Academies concluded at that time that there was not a compelling argument for continued independent data collection in the NAOMS Project. In fact, quoting from that report, the "NAOMS Project seems to be developing a methodology to establish trends in aviation safety performance that are already available through other sources within industry and government."

In 2006, the Aviation Safety Program of NASA's Aeronautic Research Mission Directorate provided additional funding to complete the transition and to document the results. The transition of the survey methodology has now been successfully completed, but the documentation has taken longer to complete than anticipated. That will be completed by the end of this year.

Now, it has been widely reported that NAOMS funding was cut or prematurely ended. That is not the case. When the project originated in 1998, it was intended to continue until 2004, as indicated in project briefings that were provided to various government and industry audiences when it began. Copies of these briefings have been provided to Committee staff for the record.

As I previously mentioned, funding was extended through '06, to allow for transition of the methodology and final documentation. And the total amount that we have now spent on this effort has been $11.3 million.

Now, with all that said, the arch, overarching goal of trying to develop methodologies the enabled data-driven safety analyses is one that we at NASA continue to embrace in the current Aviation Safety Program, and we do so in close partnership with the FAA, industry, and academia.

In order to significantly reduce the accident rate to meet the expected growth of the next generation air transportation system, it is imperative to develop a robust safety information system that discovers safety precursors before accidents occur. Accomplishing this requires the ability to combine and analyze enormous amounts of data from varied sources to detect and act on new safety threats.

To address this challenge, NASA and FAA are combining their separate and unique skills and resources under clearly-defined roles and responsibilities. NASA is focused on the development of advanced analysis alga rhythms that can be implemented in a comprehensive system that the FAA can utilize to effectively analyze a wide variety of safety data.

In order to ensure that the technology is effectively transitioned between the organizations, a program plan has been developed and is being executed. The initial response to this approach from the stakeholder community has been very positive. The FAA's Research

Engineering and Development Advisory Committee, the REDAC Safety Subcommittee, recently reported and recent means in October of '07, that it, "Believes significant progress has been made over the past year," in defining the program and its execution. The Safety Subcommittee credited the leadership of both FAA and NASA for, "Driving a well-integrated plan that will form the basis for proactive risk identification and assessment in the future."

There has been a lot of speculation in the press regarding what the NAOMS survey might reveal about the safety of the National Aerospace System. Several briefings were given to other government agencies and industry organizations by members of the NAOMS Project Team, and some of those presentations included some analyses that were based upon extrapolating the survey results to obtain, to estimate absolute numbers of events that would occur within a given time period. When this was done, for many of these events the numbers were significantly higher than reported by other means such as the Aviation Safety Reporting System or ASRS that NASA manages by statute.

However, no attempt was made to validate the NAOMS extrapolation methodology, and indeed, given the results for some cases such as engine failure events that are highly public and carefully documented affairs, there may be a reason to question the validity of the methodology itself. It is interesting to note here that in NASA's own Safety Reporting System, the NSRS, 40 percent of the events which are reported are either found – are found later to be either overstated, unverifiable, or not significant enough to require follow-up.

While some analysis of the survey results was presented to NASA, other government agencies and other personnel, unfortunately none of the research conducted in the NAOMS Project, including the underlying survey methodology, was peer reviewed or has been peer reviewed to date. Accordingly, any product of the NAOMS Project, including the survey methodology, the resulting data, and any analysis of that data should not be viewed or should not be considered at this stage as having been validated.

So in plain speaking, when I said we can release whatever data can, we will release whatever data we can be legally released, and we will do that, we do not certify that data. There has been considerable attention in the press to the supposed destruction of NAOMS data. In fact, Battelle, the prime contractor, maintains master copies of all survey data on CDs and other back-up media in its Mountain View facility. NASA's Ames Research Facility at Moffett Field also has copies of this data.

We had directed Battelle to recover or to ensure the secure destruction of any copies of survey results that might be held at locations outside Mountain View. This includes copies held by present or past Battelle NAOMS subcontractors. The purpose of that request was to ensure compliance with NASA's data security requirements as part of the contract close-out process, because the contract was scheduled to end in October of '07. This request in no way jeopardized the security of the master copies, which remain secure at Battelle and at Ames.

To ensure that no instruction—no destruction of survey results occurs, however, including those held by subcontractors, after the concerns about data destruction were raised by this committee, NASA directed the NAOMS Project Management Team and Battelle to retain all records related to the NAOMS Project, and Battelle provided the same direction to its subcontractors. We have provided all this information to the Committee.

Finally, let me focus on the *Freedom of Information Act* request. Under federal law we at NASA are required to protect confidential commercial information that is voluntarily provided to the agency and would not customarily be released to the public. That is the law. In preparing our response to the AP *Freedom of Information Act* appeal, the characterization of the requested data by Ames researchers raised concerns that the data likely contained confidential commercial information. This characterization was the basis for withholding the data under Exemption 4.

Now, considerable attention has been focused on one sentence in the final determination letter suggesting the data was being withheld because, “It could affect public confidence in and the commercial welfare of air carriers and general aviation companies.” Now, I have already made it clear that I do not agree with the way this was written, and I regret any impression that NASA was or would in any way try to put commercial interests ahead of public safety. That was not and will never be the case.

As for our plans for the data, I have directed that all NAOMS data not containing confidential commercial information or information that could compromise the anonymity of individual pilots be released as soon as possible. But at present we are concerned that it might be possible that a knowledgeable person could identify a specific individual or reconstruct specific events back to a specific individual, and we must protect against that, and no proprietary commercial information could be compromised.

We will receive a written report by Battelle by the end of this year that will include a description of the methodology, the approach, the field trials, et cetera. We will make this report available to any interested party. We intend to continue to emphasize the importance of peer review of all research results, whether conducted by NASA’s researchers or our contractors funded by NASA. Peer review is critical to the achievement of technical excellence.

Let me conclude by thanking you for this opportunity to appear before you to discuss the NAOMS issue and to answer your questions. Thank you.

[The prepared statement of Dr. Griffin follows:]

PREPARED STATEMENT OF MICHAEL D. GRIFFIN

Mr. Chairman and Members of the Committee, thank you for this opportunity to appear before you today to discuss the National Aviation Operations Monitoring Service (NAOMS) project, and the issue concerning the release of data obtained by various researchers pursuant to that project. When I was made aware last week that NAOMS pilot survey data had been withheld under a *Freedom of Information Act* request initiated by the Associated Press, I asked Dr. Lisa Porter, Associate Administrator for Aeronautics Research, to investigate the matter. I hope to provide you with information that will address the questions and concerns that have been raised by you and others during the past several days.

What is NAOMS?

There has been some confusion regarding what NAOMS actually is. The NAOMS project began in 1998 with an overarching goal of developing methods to facilitate a data-driven approach to aviation system safety analysis. Accomplishing this goal requires the generation of data that are statistically meaningful and representative of the system. The NAOMS project team decided to develop a survey methodology to acquire such data. The survey methodology development took roughly two years to complete. The actual data collection using the methodology began in April 2001 and ended in December 2004. During that time, the project team surveyed approximately 24,000 commercial airline pilots and approximately 5,000 general aviation pilots.

In early 2005, it was determined that the amount of data collected was sufficient to evaluate whether the NAOMS survey methodology indeed produced statistically meaningful and representative data. NASA's Aviation Safety and Security Program leadership thus directed the NAOMS project to complete the assessment of its survey methodology and transfer it to industry-government decision-makers (Commercial Aviation Safety Team [CAST] and Air Line Pilots Association [ALPA]), and provided FY 2005 funding to do so. It is worth noting that the 2004 Review of NASA's Aerospace Technology Enterprise by the National Academies concluded that there was not a compelling argument for continued independent data collection in the NAOMS project. In FY 2006, the Aviation Safety Program of the Aeronautics Research Mission Directorate (ARMD) provided additional funding to complete the transition and to document the results. The transition of the survey methodology has been successfully completed, but the documentation has taken longer to complete than anticipated. The documentation will be completed by the end of this year.

Why was funding for NAOMS cut?

It has been widely reported that NAOMS funding was cut or prematurely shut down. That is not the case. When the project originated in 1998, it was intended to continue until 2004, as indicated in project briefings that were provided to various government and industry audiences when the project began. (These briefings have been provided to the Committee for the record. Later briefings indicated an extension to 2005.) As I previously mentioned, funding was extended through 2006 to allow for transition of the methodology and final documentation. The total amount we spent on this effort was $11.3M.

That said, the overarching goal of trying to develop methodologies that enable data-driven system safety analyses is one that NASA continues to embrace in its current Aviation Safety Program, in close partnership with the FAA, industry, and academia. In order to continually and significantly reduce the accident rate to meet the expected growth of the Next Generation Air Transportation System (NextGen), it is imperative to develop a robust safety information system that discovers safety precursors before accidents occur. Accomplishing this requires the ability to combine and analyze vast amounts of data from many varied sources to detect and act on new safety threats.

NASA and the FAA are combining their unique skills and resources under clearly defined roles and responsibilities to address this challenge. NASA is focused on the development of advanced analysis algorithms that can be implemented in a comprehensive system that the FAA can utilize to effectively analyze a wide variety of safety data. In order to ensure that the technology is effectively transitioned between organizations, a program plan has been developed and is being executed. The initial response to this approach from the stakeholder community has been very positive. The FAA Research Engineering and Development Advisory Committee (REDAC) Safety Subcommittee recently reported out to the REDAC in October 2007 that it "believes significant progress has been made over the past year" in defining the program and its execution. The Subcommittee credited the leadership of both the FAA and NASA for "driving a well integrated plan that will form the basis for proactive risk identification and assessment in the future."

What do the data show?

There has been much speculation in the press regarding what the data will reveal about the safety of our national airspace system. Several briefings were given to other government and industry organizations by members of the NAOMS project team, and some of those presentations included some analyses that were based upon extrapolation methods to estimate absolute numbers of events occurring within a given time period. For many of these events, the numbers were significantly higher than reported by other means, such as the Aviation Safety Reporting System (ASRS). However, there was no attempt made to validate the extrapolation methodology. Indeed, given the results for some examples such as engine failure events, there may be reason to question the validity of the methodology.

While some analysis of the data was presented to NASA and other government personnel, unfortunately, none of the research conducted in the NAOMS project, including the survey methodology, has been peer-reviewed to date. Accordingly, any product of the NAOMS project, including the survey methodology, the data, and any analysis of that data, should not be viewed or considered at this stage as having been validated.

Did NASA destroy any data?

There has been considerable attention in the press to the supposed destruction of NAOMS data. Battelle Memorial Institute, the prime contractor, maintains master copies of all NAOMS survey results on compact discs and other backup media in its Mountain View, Calif., facility. NASA's Ames Research Facility at Moffett Field, Calif., also maintains copies of this data.

NASA had directed Battelle to recover, or ensure secure destruction of, any copies of the NAOMS data that might be held at locations outside of Mountain View. This includes copies held by present or past Battelle NAOMS subcontractors. The purpose of this request was to ensure compliance with NASA data security requirements as part of the contract close-out process, because the contract is scheduled to end in October 2007. This request in no way jeopardized the security of the master copies, which remain secure at Battelle and the Ames Research Facility.

To ensure that no destruction of data, including data held by sub-contractors, occurred after concerns about data destruction were raised by this committee, NASA notified the NAOMS project management team and Battelle to retain all records related to the NAOMS project. Battelle provided the same direction to its subcontractors.

Dissemination of research results

One of the most important NASA principles is to ensure the dissemination of research results to the widest practical and appropriate extent. This principle has received particular focus during the restructuring of ARMD. The emphasis on open dissemination is clearly stated in ARMD's fully and openly competed NASA Research Announcements as well as in the Space Act Agreements that it establishes with commercial organizations for collaborative research. Furthermore, all of ARMD's project plans include documentation and publication of results as deliverables. We firmly believe in the importance of the peer-review process, which is essential for ensuring technical excellence.

Why did NASA reject the FOIA request?

Under federal law, NASA is required to protect confidential commercial information that is voluntarily provided to the agency and would not customarily be released to the public. In preparing the response to the Associated Press' *Freedom of Information Act* appeal, the characterization of the requested data by Ames researchers raised concerns that the data likely contained confidential commercial information. This characterization was the basis for withholding the data under Exemption 4.

Considerable attention has been focused on one sentence in the final determination letter suggesting the data was being withheld because it could "affect the public confidence in, and the commercial welfare of, the air carriers and general aviation companies." I have already made clear that I do not agree with the way it was written. I regret any impression that NASA was in any way trying to put commercial interests ahead of public safety. That was not and never will be the case.

NASA plans

I have directed that all NAOMS data that does not contain confidential commercial information, or information that could compromise the anonymity of individual pilots, be released as soon as possible. The release of this data will be accompanied with the proviso that neither the methodology nor the results have received the level of peer review required of a NASA research project. Therefore, the survey methodology and the data should not be considered to have been verified.

NASA will receive a final report from Battelle by December 31, 2007 that will include a comprehensive description of the methodology, including approach, field trials, etc. NASA will make this report available to any interested party.

We intend to continue to emphasize the importance of peer-review of all research results, whether conducted by NASA researchers or contractors funded by NASA. Peer-review is critical to the achievement of technical excellence.

Concluding remarks

Let me conclude by thanking you again for this opportunity to appear before you to discuss NAOMS and to answer your questions.

Chairman GORDON. Thank you, Dr. Griffin, for your candor once again, and Mr. Hall, you are recognized.

STATEMENT OF MR. JAMES E. HALL, MANAGING PARTNER, HALL AND ASSOCIATES, LLC; FORMER CHAIRMAN, NATIONAL TRANSPORTATION SAFETY BOARD (NTSB)

Mr. HALL. Thank you, Mr. Chairman, Representative Hall, and distinguished Members of this committee. I have provided extended testimony that I would like to submit for the record if it pleases the Chairman.

Chairman GORDON. No objection.

Mr. HALL. And it is I think significant that this meeting is being held on the eighth anniversary of the Egypt air accident that occurred during my watch at the NTSB. I appreciate the opportunity to speak on aviation safety. Can NASA do more to protect the public? This is one of the issues that was addressed 10 years ago by the 1996, White House Commission on Aviation Safety and Security, which I had the privilege to serve on. The commission was prompted in large part by the tragic aviation accidents of that year, ValuJet and TWA 800.

Before I begin, however, I would like to share with this committee that the most important thing, the most important thing I learned in my seven years at the NTSB, and that is the culture of aviation safety has been built upon constant critical self-examination. Open and transparent information flow is the key to aviation safety. With openness in mind, the members of the 1996 commission felt that we needed to get ahead of events in a rapidly changing environment to be able to improve the safety and security of aviation before, not after, another tragic accident occurred.

Notable safety recommendations issued by the commission included the establishment of standards for continuous safety improvement, a target rate of 80 percent was said for the reduction of fatal accidents. And we continued, which has considerable expertise in resources and the area of safety research, to expand its involvement in the promotion of aviation safety.

In this last point the extremely important safety research function is what brings us here today. Since the commission met, we have seen a 65 percent reduction in fatal accidents. While this is certainly welcome news, there are dangerous trends in the aviation industry that stand to jeopardize that progress. These include air traffic controller and pilot staffing levels, the number of runway incursions, the dramatic increase we will see in general aviation, the development and implementation of NextGen, UAVs and the explosion in passenger levels, which the Chairman referred to and which is estimated to reach 2.3 billion by the year 2027.

More work indeed remains, which makes it all the more frustrating that NASA withheld results obtained from what I first believed was an $8.5 million taxpayer-funded National survey of almost 24,000 pilots. This survey reportedly states that runway incursions, wildlife strikes, and near collisions occur at a rate at least twice as much as is commonly thought.

As justification to its denial of a FOIA request the NASA spokesman cited the potentially harmful effects on the commercial welfare of the air carriers and public confidence in aviation.

Such action, I believe, runs counter to the safety culture mentality that the government and industry have worked to create over the past 10 years. As the Government Accounting Office has observed, transparency forms the fundamental basis for any safety program. If we don't know something is broken, we cannot fix it.

It is difficult to overemphasize the importance of transparency and accountability in aviation. I know each one of you Members fly probably weekly. I believe that that transparency and accountability that is the single greatest reason you are so safe when you get on an airplane today. The history of transparency began with the Wright Brothers, who assisted in the investigation of the first fatal aviation accident in 1908, and used the results to incorporate changes to their flying machine in order to save lives.

This open process has resulted in numerous important advances in aviation. NTSB investigations and recommendations have led to the advent of the Traffic Alert and Collision Avoidance System, commonly known as TACAS, Low-Level Wind Sheer Alert System, anti-collision Systems and Ground Proximity Warning Systems to name but a few.

To repeat, information flow is the key to safety. In its investigation into the two Shuttle accidents in 1986, and 2003, NASA itself noted that a decline in transparency and accountability among management and not simply a lack of adequate funding for safety was a root cause of both disasters.

Furthermore, because major aviation accidents are now such a rarity, our ability to identify risks and maintain or increase safety now depends primarily on our ability to fully analyze incidents and trends. A true safety culture requires transparency and constant diligence. The vigilance, excuse me, is required of all involved in the aviation industry, but its absence is probably most glaring when it is the fault of government, the servants of the American people.

NASA needs to release this information and fulfill its responsibilities as envisioned by the 1996, White House Commission. To do otherwise, I believe, flies in the face of aviation history, responsible government, and common sense.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Hall follows:]

Prepared Statement of James E. Hall

Good afternoon Mr. Chairman and Members of the Committee:

Thank you for allowing me the opportunity today to speak on the subject of *Aviation Safety: Can NASA Do More to Protect the Public?* My name is Jim Hall, and for more than seven years I served as Chairman of the National Transportation Safety Board (NTSB). I also had the honor to serve as a Commissioner on the 1996 White House Commission on Aviation Safety and Security.

As you know, the NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States as well as significant accidents in the other modes of transportation—railroad, highway, marine, and pipeline. Since its inception in 1967, the NTSB has investigated more than 124,000 aviation accidents and over 10,000 surface transportation accidents, and has also assisted many foreign governments with their own investigations. In its issuance of more than 12,000 recommendations in all transportation modes to more than 2,200 recipients, the Board has established a solid reputation for diligence and impartiality. From 1994 to 2001, I headed this organization that serves as the "eyes and ears" of the American people at aviation and other transportation accidents across the country and around the world. Now, as a transportation safety and security consultant, I continue my commitment to promoting safety in our nation's transportation system.

Today I would like to put the current aviation safety environment in a historical context. Ten years ago we were confronted with a special situation of change and risk in the aviation industry. In response, the Commission on Aviation Safety and Security was formed, which I will discuss in a moment. I believe that today we face a similar situation, what I like to call “the next generation of risks.”

The Gore Commission

In 1996, the Federal Government initiated a decade-long overhaul of aviation safety that began with the establishment of the White House Commission on Aviation Safety and Security, headed by Vice President Al Gore. The Gore Commission, as it would come to be called, was formed for three major reasons.

On May 11, 1996, ValuJet flight 592 crashed in the Everglades after an in-flight fire caused by transported oxygen canisters, killing all 110 people on board. In the resulting NTSB investigation, we found airline contractors and ValuJet—an airline that had been formed just three years prior to the flight 592 crash—negligent in several areas, including oversight and mishandling of hazardous materials. We also determined if previous recommendations issued in 1988 regarding fire detection and extinguishing systems had been adopted, flight 592 would likely not have crashed. It was, therefore, a largely preventable and tragic loss of life.

The second major reason for the formation of the Gore Commission was an incident occurring only two months after the ValuJet crash. On July 17, 1996, Trans World Airlines Flight 800 experienced an in-flight break up following an explosion of the center wing fuel tank (CWT) shortly after take off from John F. Kennedy Airport in New York City, killing all 230 people on-board. After an extensive 17-month investigation, we determined the source of the explosion to be an ignition of the flammable fuel/air mixture in the tank, an ignition most likely caused by a short circuit outside of the fuel tank. The NTSB issued specific recommendations on wiring and design as well as broader management of the aging aircraft fleet. In the period immediately following the crash, concerns of possible security problems led President Clinton to call for an immediate report on aviation security within 45 days.

The third reason that led to the Gore Commission was the general feeling that aviation—an industry that generated $300 billion annually and employed close to one million Americans—was undergoing profound changes. In the ten years prior to 1996, the Federal Aviation Administration (FAA) had certified twenty new aircraft models and the number of passengers flying in the United States exceeded more than a half billion. New digital technology was being developed to improve communication and navigation. Sixty new airlines, such as ValuJet, had started operations since 1992. The commercial airline fleet was both quickly aging and in the midst of rapid replacement of aircraft. The domestic market faced the possibility of increased competition from foreign carriers. To add to this, the FAA predicted that by 2007, more than 800 million passengers would fly in the United States.

In this setting, and in light of two very public and tragic accidents, the Gore Commission was created with three specific mandates: to examine security threats and ways to address them; to analyze overall changes in the industry and the appropriate adaptation of government regulation to these changes; and to look at technological changes in the air traffic control system. All of us involved at the time felt that we needed to “get ahead” of events in a rapidly changing environment, to improve the safety and security of aviation before—not after—another tragic accident occurred.

Over six months I and the fellow members of the commission—which included the Secretary of Transportation, two retired Air Force generals, the director of FBI, and several scientists—conducted dozens of site visits in the U.S. and abroad, held six public meetings, and co-sponsored an International Conference on Aviation Safety and Security attended by over 700 representatives from sixty-one countries. From our findings we issued some fifty-one separate recommendations covering a variety of issues from safety to security to the notification of family members following an incident.

Notable safety recommendations issued by the Commission included: the establishment of standards for continuous safety improvement (a target rate of 80 percent was set for the reduction of fatal accidents); extension of FAA oversight to aviation contractors; the simplification of Federal Aviation Regulations; an emphasis on human factor safety research and training; and an extension of whistleblower statutory protection to the aviation industry. To be sure, not every recommendation made was subsequently enacted, nor was every possible safety item individually addressed—no commission can claim perfection in this respect. Nevertheless, many recommendations were in fact adopted and perhaps even more significantly, the Presidential attention shown to the issue sent a message to both government and industry leaders that the establishment of a safety culture was not an option. It is therefore no coincidence that in the ten year period following the commission, the industry successfully reduced fatal accidents by 65 percent, 15 percent shy of the national goal, but noteworthy nonetheless.

This reduction was due not only to the actions of the airlines but to government efforts as well. The Commission charged the FAA, Department of Transportation (DOT), and NTSB to be more vigorous in their certification, regulation, and investigative functions. It also urged the expansion of research, and specifically noted the need for the National Aeronautics and Space Administration (NASA), "which has considerable expertise and resources in the area of safety research, to expand its involvement in the promotion of aviation safety."

As a result of the Commission's recommendation, NASA launched its $500 million Aviation Safety Program (AvSP) a partnership with the Department of Defense (DOD), FAA, and the aviation industry to focus on accident prevention, accident mitigation, and aviation system monitoring and modeling. It is this last point, the extremely important safety research function, which brings us here today. Given a rapidly changing environment and a new set of risks, the attempt on the part of NASA to suppress safety data is a grave and dangerous challenge to the safety culture that has developed over the last century of aviation history, due to lessons learned from past accidents and incidents.

The Next Generation of Risks

The 65 percent reduction in fatal accidents over the past ten years is certainly welcome news, but while many advances have been made, there are dangerous trends in the aviation industry that stand to jeopardize this progress.

We are currently in the middle of an air traffic controller staffing crisis. Fueled in part by the lack of a contract, this crisis has industry-wide consequences including: more and longer flight delays, combined radar and tower control positions, and an increased use of mandatory overtime resulting in an exhausted, stressed out, and burned out workforce. According to the National Air Traffic Controller Association (NATCA) there were 856 retirements in fiscal year 2007, (7.4 percent of the total experienced controller workforce), leaving the country with a 15-year low in the number of fully certified controllers and a surplus of new hires—many with no air traffic control experience or education. Total controller attrition in FY07 was 1,558, nearly wiping out any net gains in total staffing made by the FAA's hiring efforts. In fact, the agency estimates it will lose about 70 percent of the air traffic controller workforce over the next 10 years.

Air Traffic Controllers are not the only ones retiring. Pilot staffing levels are dangerously low as a result of retiring baby-boomers and an explosion of new airlines and increased airline fleets in Asia and the Middle East, raising similar concerns of an influx of inexperienced and insufficiently trained pilots. In 2009, airlines will have to fill 20,000 openings due to retirements and other factors. Some airlines facing pilot shortages are lowering experience requirements to the FAA minimum.

Other operational and technological areas present potentially problematic trends as well. Runway incursions, which have been on the NTSB's Most Wanted Safety Improvement list since 2001, totaled over 1,300 between fiscal years 2003 and 2006. Among the aviation safety community, the Tenerife incursion accident that killed 583 people in the Canary Islands in 1977 stands as a sober reminder of the importance of getting this number down. The April 25, 2006 crash of an unmanned aerial vehicle (UAV) in Nogales, Arizona, and the resulting NTSB investigation and 22 recommendations illustrate the potential problems with the growing expansion of drone flights in the U.S. General aviation and the air ambulance fleet have also increased in the last ten years; however the FAA does not collect actual flight activity data for general aviation operators and air taxis, instead using an annual survey to query a sample of registered aircraft owners.

Several new aircraft types will emerge in the years ahead, ranging from the jumbo Airbus A380 that seats more than 500 passengers—a jet so large as to raise safety concerns in its own right—to very light jets that might transport six or fewer passengers. As many as four to five hundred new very light jets are scheduled to be introduced into American airspace each year starting in 2008.

The Next Generation Air Transportation System (NextGen), a major and much-needed technology upgrade for the air traffic control system scheduled for completion in 2025, will only add to the variables that need to be factored in aviation safety, especially if NextGen is not adequately funded, implemented, or regulated.

Overshadowing all these developments is a major growth in demand for air travel. In fiscal year 2006, over 740 million passengers flew in American skies. That figure is projected to reach one billion by 2015 and close to 2.3 billion by 2027. These numbers are absolutely staggering. On January 1, 2007 federal regulations on the quantity of planes able to use J.F.K. airport ended, and traffic has increased by some 20 percent. Congestion and resulting delays may be inconvenient, but it also increases the potential for mishaps. As a Government Accounting Office (GAO) report released in February of this year noted, "although the system remains extraordinarily safe, if the current accident rate continues while air traffic potentially triples in the next 20 years, this country would see nine fatal commercial accidents each year, on average."

I am not suggesting that nothing is being done to address these issues. I think individuals such as Marion Blakely, former administrator of the FAA, and Bobby Sturgell, current Acting Administrator of the FAA, have taken strong steps to address safety concerns. And yet, to again cite the GAO study, "FAA's approaches to safety require that the agency obtain accurate and complete data to monitor safety trends, fully implement its safety programs, and assess their effectiveness to determine if they are focused on the greatest safety risk. FAA has made progress in this area *but more work remains* [italics added]."

The Withholding of NASA's Data

More work indeed remains, which makes it all the more frustrating that NASA withheld results obtained from an $8.5 million tax payer funded national survey of almost 24,000 pilots. This survey reportedly states that runway incursions, wildlife strikes, and near collisions occur at a rate at least twice as much as is commonly thought. As justification to its denial of a *Freedom of Information Act* request, NASA cited the potentially harmful affects on the commercial welfare of the air carriers and general aviation companies.

Such an action runs exactly counter to the safety culture mentality the government and industry have worked to create over the past ten years. As the GAO observed, transparency forms the fundamental basis for any safety program. If we don't know something is broken, we cannot fix it. If we do not know that runway incursions are actually occurring at a much higher level, then we cannot take steps and assign the resources to deal with them.

It is difficult to overemphasize the importance of transparency and accountability in aviation. It is the single greatest reason why you are so safe when you get on an airplane today. The history of transparency began with the Wright Brothers, who assisted in the investigation of the first fatal aviation accident and used the results to incorporate changes to their flying machine in order to save lives. In September 1908, five years after the Wrights' historic flight, Orville and Lt. Thomas Selfridge were conducting an aerial demonstration for the Army in Fort Meyers, Virginia when their airplane stopped responding to controls and crashed, injuring Orville and killing Lt. Selfridge. The Wright Brothers' commitment to objective scrutiny and constant improvement set an historic precedent and has led to a safety culture in aviation that is built on fact finding, analysis and open sharing of information to advance aviation and save lives. This open process has resulted in numerous important advances in aviation. In the modern era, NTSB investigations and recommendations have led to smoke detectors in airplane lavatories, floor level lighting strips to lead passengers to emergency exits, anti-collision systems, and ground proximity warning devices, to name but a few.

The industry often very clearly responds to the efforts of safety research even before investigations are completed. On September 8, 1994, USAir flight 427, a Boeing 737, crashed while on approach to Pittsburgh, Pennsylvania. After 80,000 hours of investigation, the NTSB had not yet completed its final report but had issued several recommendations. In response, Boeing and the FAA began developing and certifying several modifications to the 737 main rudder power control unit (PCU) servo valve. The FAA proposed an Airworthiness Directive to require the installation of newly designed PCUs within two years. Most airlines began providing training to pilots on the recognition, prevention, and recovery of aircraft attitudes normally not associated with air carrier flight operations.

On October 31, 1994, an American Eagle ATR–72 crashed in Roselawn, Indiana. Seven days after the crash of an ATR–72 in Roselawn, Indiana, we issued recommendations covering the operation of those aircraft in icing conditions. Thanks to a then state-of-the-art flight recorder, we were able to learn within days that the French-built ATRs upset was initiated by a rapid deflection of the right aileron. The NTSB deduced that this deflection was caused by the accumulation of a substantial amount of ice on the wings during the 30 minutes the plane was in a holding pattern. Within a week of the accident, the NTSB issued urgent safety recommendations to the FAA to restrict the operation of ATRs in icing conditions until a fix could be developed to counteract the phenomenon the accident aircraft encountered. Within a month, following test flights in the United States and France, the FAA effectively grounded the aircraft in icing conditions. A redesign of the wing anti-icing boots was developed, and the modified airplanes returned to the skies.

One of the keys to the Roselawn investigation was the fact that the flight data recorder (FDR) was recovered and that it recorded some 98 parameters, giving investigators ample information with which they could quickly establish the cause of the accident and the most appropriate fix. This contrasts with the FDR on-board flight 427 the previous month, which recorded only 11 parameters and in so small part delayed the release of the final investigation report by over four years. In a sense, NASA's refusal to release their safety data is tantamount to denying investigators access to black boxes. Both actions seriously impede the ability to determine potentially critical safety concerns.

Information flow is the key to safety, whether to the investigator actually assembling pieces on the ground or to the analyst compiling survey data back in the office. In its investigations into the two Shuttle accidents in 1986 and 2003, NASA itself noted that a decline in transparency and accountability among management—and not simply a lack of adequate funding for safety—was a root cause of both incidents.

The investigation into the *Challenger* explosion specifically faulted management isolation and a failure to provide full and timely information. The final report of the *Columbia* Accident Investigation Board (CAIB) noted that for both the *Columbia* and *Challenger* accidents, "there were moments when management definitions of risk might have been reversed were it not for the many missing signals—an absence of trend analysis, imagery data not obtained, concerns not voiced, information overlooked or dropped from briefings." The Chairman of the CAIB, Retired Navy Admiral Harold Gehman pointed out that NASA tends to initially follow safety procedures quite well, but then loses its diligence as time progresses. *Columbia* investigation board member Air Force Major General John Barry stated that "there is still evidence of a silent safety program with echoes of *Challenger.*" Safety and silence are simply incompatible.

The culture of aviation safety has been built on constant critical self examination, in an open environment, with full sharing of all the facts and analysis. Because we are safer today than yesterday does not mean that we cannot be safer tomorrow. It also doesn't mean that our gains are not perishable. For example, on July 2, 1994 USAir flight 1016 crashed in Charlotte, North Carolina. We determined that the causal factor was something we hadn't seen in the United States in almost a decade: wind shear. Wind shear detection equipment and improved pilot training had all but eliminated this hazard and yet more sophisticated weather detection equipment—Terminal Doppler Radar—had fallen years behind schedule due to procurement and design problems.

Furthermore, because we have made major accidents such a rarity, our ability to identify risks, and maintain or increase safety now depends primarily on our ability to fully analyze incidents and trends. In the absence of a major fatality accident or without a complete picture of runway incursions, wildlife strikes, and near-misses, we may be lulled into a false sense of security—only to have that eventually broken by a catastrophic loss of life. A true safety culture requires transparency and constant vigilance.

This vigilance is required of all involved in the aviation industry, but its absence is perhaps most glaring when it is the fault of government, the servants of the American people. As Chairman of the NTSB, I followed the dictum of Benjamin Franklin, who said, "The man who does things makes many mistakes, but he never makes the biggest mistake of all—doing nothing." I never wanted the American people to think that, when a need was identified—as it was in any number of safety-sensitive issues—we did nothing. Let us then not shrink from action but rather call on NASA to release its information, the denial of which flies in the face of aviation history, responsible government, and common sense.

Conclusion

We are clearly facing a new generation of risks. New technology, new planes, personnel shortages, and a massive projected increase in air travel mean that new hazards are approaching. Before we push the panic button, however, we should remember that we have been in this situation before. In 1996, we projected an increase of 220 million passengers in the next ten years and identified a host of technological and operational concerns that would compound this development. In response the President formed a commission and its recommendations—though not perfect and not all implemented—contributed to a substantial reduction in fatal accidents. Today in 2007, we are forecasting an increase of 260 million passengers in the next eight years and an increase of 1.5 billion in the next twenty. We have personnel shortages looming or already underway and have committed ourselves to new technology. In fact the only major difference between 1996 and 2007 was 1996's dramatic and tragic loss of 340 lives in two accidents.

Congress, government agencies, and the aviation industry must once again come together to address the rapidly changing aviation environment. We must stay ahead of events instead of waiting for another crash. Steps must be taken to prevent a deterioration of our nation's aviation safety culture, a deterioration that NASA's denial of transparency plainly represents. In only such a manner can we adapt to a growing and diversifying industry with a rigid adherence and commitment to the safety of all who fly in our nation's airspace.

BIOGRAPHY FOR JAMES E. HALL

Jim Hall is a leading expert on crisis management and government relations, and transportation safety and security, having served government and private clients for more than 35 years.

Hall was nominated by President Clinton to the National Transportation Safety Board in 1993, became the Board's Chairman in 1994 and led the Board through January 2001.

During his chairmanship, Hall worked tirelessly to improve safety in all modes of transportation in the U.S. and abroad. He visited more than 30 nations as Chairman, and oversaw a period of unprecedented activity as the NTSB investigated numerous major aviation, rail, pipeline and maritime accidents in the U.S. and assisted in many international accident investigations. Among the major investigations the NTSB conducted while Hall was Chairman were the aviation cases of USAir 427, TWA 800, and EgyptAir 990, the Olympic Pipeline accident in Bellingham, Wash., the AMTRAK crash in Bourbonnais, Ill., and a Carnival Cruise Line accident near Miami. In 1996, President Clinton named Hall to the White House Commission on Aviation Safety and Security.

Under Hall's leadership, the NTSB issued landmark safety studies on commuter airlines, the air tour industry, the performance and use of child restraint systems, personal watercraft, transit bus operations, passive-grade railway crossings and the dangers posed to children by passenger-side airbags in automobiles.

Hall began his career in Washington serving as counsel to the Senate Subcommittee on Intergovernmental Relations and a member of the staff of Senator Albert Gore, Sr. He maintained a private legal practice in Chattanooga, Tennessee, before serving in the cabinet of Tennessee Governor Ned McWherter. Hall served as Director of the state's Planning Office for five years, and then returned to Washington, D.C., to serve as Chief of Staff for Senator Harlan Mathews before being appointed to the NTSB.

Today, Hall serves as an adviser to governments and private clients on transportation safety and security, crisis management and government relations. He is a frequent speaker at industry events, an oft-quoted expert source by television and print reporters, and an author of numerous Op-Ed pieces. Hall has appeared on virtually every major television news program, including "60 Minutes," the "Today" show, "Nightline," "Larry King Live," "Fox & Friends," and "BBC News," and his columns have appeared in publications such as the *New York Times* and *USA Today.* In 2002, the U.S. Forest Service named Hall to co-chair a blue-ribbon safety review of the operations of firefighting aircraft after three such aircraft crashed that summer.

Hall is a University of Tennessee Trustee, serves as Chairman of the Enterprise Center in Chattanooga, on the Board of Directors of the Chattanooga Metropolitan Airport Authority and the Tennessee River Gorge Trust. Hall has also served on the National Academy of Engineering's Committee on Combating Terrorism, Co-Chairman of Blue Ribbon Report of Aerial Fire Fighting Safety and the Aviation Institute Advisory Board of George Washington University.

Hall has given congressional testimony before numerous House and Senate committees, including the House Committee on Transportation and Infrastructure (Aviation and Railroad Subcommittees), the Senate Committee on Commerce, Science and Transportation (Transportation and Surface Transportation/Merchant Marine Subcommittees).

Hall graduated from the University of Tennessee in 1967 with a Baccalaureate of legal letters degree. He served as a commissioned officer in the U.S. Army from 1967 to 1973, receiving the Bronze Star for Meritorious Service in Vietnam in 1969.

DISCUSSION

Chairman GORDON. Thank you, Mr. Hall. At this point we will open it for our first round of questions, and the Chair recognizes himself.

Let me first state that I think by any measure you might take, particularly if you want to say the number of miles flown that United States has the safest air transportation system in the world. I fly, as Mr. Hall says, almost every week, often with my wife and my daughter. I don't intend to change those flight plans in any way, so our discussion today is not safety and non-safety. It is safety and more safety. And so we should make that very clear.

And let me also say that, you know, 24,000 commercial pilots and 5,000 private pilots, I mean, that to me sounds like an unprecedented amount for a survey, and so that is an enormous amount of data that I think should be made available, and although I recognize NASA's interest in a particular methodology, I think that oftentimes some of the most important discoveries in America have been those offshoots of information.

RELEASE OF NASA REPORT

So I would ask you, Director Griffin, now that your lawyers have for over a year had this request on the Freedom of Information, when can we, why can't this material be released today?

Dr. GRIFFIN. When we look at the material, despite the certifications that you—that I know you have heard from the contractor involved, the data, in fact, today could not in its fullness be legally released.

Chairman GORDON. And why is that?

Dr. GRIFFIN. Because it does contain specific comments that identify certain airlines. It contains—it notes accidents and incidents or occurrences that sight specific timeframes, specific airports, specific makes and models of airplanes. If I look at that data, I can reconstruct for you——

Chairman GORDON. Dr. Griffin——

Dr. GRIFFIN.—and so we are going to delete those fields. We are asking our contractor to delete those fields and to render data back to us which is not identifiable as they were originally required to do.

Chairman GORDON. Director, I only have five minutes. I am sorry.

We have asked your lawyers to cite that you were nice enough to provide the information to us. We couldn't find it. We have asked your lawyers to point us in that direction to that information. They couldn't do it. Have you seen the specific information?

REASONS FOR NOT RELEASING PARTS OF THE REPORT

Dr. GRIFFIN. I have seen examples of specific information which would not be——

Chairman GORDON. In this report?

Dr. GRIFFIN. In this report which would not be releasable.

Chairman GORDON. Okay. Well, it would have been helpful if your lawyers had shown us, because we specifically asked that. But let me also—I want to put up a slide if I could, please, from your contractor. Apparently there is a program that is supposed to scrub it, and within NASA's own information it says, participant confidentiality is assured. So apparently you have already done this.

Dr. GRIFFIN. Well, no. That information is not as it stands correct.

Chairman GORDON. Even though it has a NASA logo on it?

Dr. GRIFFIN. I am sorry. It is not correct. Okay. It is possible to look at this data, and if one knows anything about aviation, in some cases to go back and identify the participants, and that can't be allowed.

Chairman GORDON. So NASA was premature in certifying its confidentiality?

Dr. GRIFFIN. Correct.

Chairman GORDON. All right. Well, let me ask you this. You are familiar with the Aviation Safety Reporting System.

Dr. GRIFFIN. Very much so.

Chairman GORDON. Okay. Let me just—I want to read to you one section of that that is from March of 2004. And this is up on the Internet. This is available for everybody. "After two previous," and I am quoting. "After two previous red-eyes, this being the third red-eye in a row, the last 45 minutes of flight I fell asleep and so did the first officer, missed all calls from the air traffic control." That was the quote. This is a report made by an aircraft crew member who slept through their decent, clearance, 60 miles southeast of Denver. Once they are awakened by the frantic calls from the air traffic control, they executed a successful landing.

Now, this is just one of thousands of the reports that identify the airport, sometimes the approximate time, aircraft, runway numbers. This material is public.

Dr. GRIFFIN. That is true.

Chairman GORDON. So why should your survey not be public? Is it going to go into more, I mean, have you not, have they not done what they said they were going to do and scrub it to at least this extent?

Dr. GRIFFIN. When we look at the data, we do not at this point believe the data has been scrubbed sufficiently to assure confidentiality of the participants and to protect confidential commercial information according to the standard to which we are held. As soon as we can do that, we will release the data. Now——

Chairman GORDON. Are you going to have a standard higher than this ASRS?

Dr. GRIFFIN. I wouldn't say so.

Chairman GORDON. Okay. So the information that I just read to you that is already public, you would not say that has to be scrubbed. They have to be greater, I don't know how, you know, a greater level of detail to be scrubbed?

Dr. GRIFFIN. I don't know that I would characterize it as a greater or lesser level of detail, but we do need to remove specific references to airlines, specific references to incidents and timeframes such that pilot identity could be reconstructed. We think that that would be a relatively straightforward process to delete certain of the fields which convey that information, and we believe the initial release of the data could occur by the end of this year.

Chairman GORDON. And so you are going to do it by fields, so it will be by a computer program?

Dr. GRIFFIN. Right. Certain of the fields will be——

Chairman GORDON. Okay. Well, it seems like that is what has already been done here, and if it is going to computer program, why can't you do it today, tomorrow.

Dr. GRIFFIN. I think you——

Chairman GORDON. ——before the end of the year?

Dr. GRIFFIN.—maybe, when you look at that view graph, there may be some confusion between anonymizing the data to satisfy Privacy Act considerations and rendering the data such that no one knowledgeable in the field of aviation could go back and reconstruct it.

Chairman GORDON. Well, isn't that the same thing?

Dr. GRIFFIN. I am not trying——

Chairman GORDON. If it was the Freedom of Information that the AP asked for this from the Freedom of Information, then wouldn't you have assumed it would be made public record? And so it is the same thing, the same level of caution?

And you folks had a year to do this already.

Dr. GRIFFIN. I don't think we have had a year since the original submission, since the submission of the FOIA request.

In any case, I am not defending, I stated for the record, and I will state for the record again that I believe the FOIA determination that we should not release the data was incorrect, okay? We will release the data. As we set out to look at the data, to verify whether we could release it or not, we found that the data had not, in fact, been correctly scrubbed to remove identifying data. And if it had been, I would have released it on the spot, but it has not, and so until and unless I can verify that it has been correctly scrubbed, it will not be released.

INFORMATION ABOUT THE DATA THAT WAS RELEASED

Chairman GORDON. Okay. I don't want to infringe on my time. You have never given me a reason not to trust your statement in any way. Let me just tell you that we have asked your lawyers specifically to provide us that information, to point some place. We have not been, you know, you have given us data.

Dr. GRIFFIN. Yes, sir.

Chairman GORDON. So all you got to do is say, look here, look there. And so it would give me a greater level of confidence if your folks could tell us where and could give us one example. Then we could feel more comfortable that you need this additional time.

Dr. GRIFFIN. Yes, sir. Let me then take that request for the record, and we will provide you with a couple, at least a couple of examples——

Chairman GORDON. Okay.

Dr. GRIFFIN.—where specific identifying information is included that would allow pilot, participant identities to be compromised. They do exist, and we will provide those for you.

Chairman GORDON. And I would hope there would be to a greater clarity than what is already of public record on the ASRS.

Dr. GRIFFIN. They are extraordinarily clear.

Chairman GORDON. Thank you——

Dr. GRIFFIN. I will provide that.

[The information follows:]

MATERIAL FOR THE RECORD

One way, but not the only way, by which the identification of a NAOMS survey respondent can potentially be determined is by combining the free-text fields (pilots' open-ended responses and clarifications) with data from other parts of the survey and/or external (exogenous) data sources.

The availability of exogenous databases and sophisticated search technology makes the likelihood of implicit identification greater, and it is correspondingly more difficult to ensure that adequate protections have been implemented.

The following two examples cite free-text field responses to Question ER 1 of Section B (Safety Related Events), which asked pilots how many times in the past 60 days an aircraft, on which they were a crew member, was diverted to an alternative airport and provide the cause for the diversion.

Example I (Case ID 90P0001): the pilot responded, "Earthquake in Seattle." A web search reveals the only seismic event that diverted flights from the Seattle–Tacoma Airport during the survey period: A magnitude 6.8 earthquake on February 28, 2001. During the period of closure and reduced operations that day, approximately 100 arriving flights were diverted; the exact number, together with airline and flight identifiers, could be obtained from Federal Aviation Administration (FAA), airline, and/or airport. databases.

- This single response has reduced the number of candidate responders from over 60,000 (the number of air-carrier certificated pilots listed in the Airmen's Registry) to approximately 200.
- This profile can be further refined using non-redacted NAOMS data from other questions.
    - From Section A, we can determine the pilot's flight profile for the past 60 days (e.g., number of hours and flight legs flown; the makes, models, and series of aircraft flown; whether flights were passenger or cargo, whether the pilot flew as captain or first officer, whether the pilot flies for a small, medium, or large operator; and the pilot's total commercial flight hours).
    - From Section B, if the pilot gave a positive response to any reportable safety event, an individual could cross-reference the pilot profile to event reports (FAA, airline) from the defined interview window (i.e., February 28th ± 60 days) to match an individual's name to the profile. If not, the profile may still match a name on airline duty rosters or other exogenous databases.

Example II (Case ID 90C2001): the pilot's stated cause for diversion was, "American 587 crashed at JFK. R was en-route to JFK at the time and was diverted to Philadelphia." Again, this free-text field response provides a specific event (the crash of an Airbus A300–600 into Belle Harbor at 9:17 AM local time on November 12, 2001) for which there are detailed records of diverted flights. The pilot has also specified the alternate airport (Philadelphia), further limiting the field of possible flights. As before, the respondent's profile could be refined by the non-redacted NAOMS data. When cross-correlated with exogenous databases, the refined profile might again lead to the identification of a NAOMS survey respondent.

Chairman GORDON.—very much, sir. And I now recognize Mr. Hall.

CONFIDENTIALITY OF INFORMATION ABOUT PILOTS AND COMMERCIAL INFORMATION

Mr. HALL OF TEXAS. Dr. Griffin, I will get right down to the basis of this, and we are talking about confidentiality at this time. When, and you can give me a yes or no answer on this I think, when pilots were surveyed, were they led to believe that their responses would be confidential?

Dr. GRIFFIN. They were promised confidentiality. Yes.

Mr. HALL OF TEXAS. So if their responses were released, do you think it would have had a chilling affect on their future participation in FAA or NASA surveys, and would airline safety ultimately be hurt by disclosing this data if fewer pilots contributed to other surveys and reporting systems?

Or let me go on a little bit—be a little more personal with that. As a pilot yourself with many years of flying experience, would this data give you pause as to whether it is really anonymous, or would it worry you that your input could be traced back to you? And would that have a chilling affect on you?

Dr. GRIFFIN. Well, in its present form some of the examples can be traced back to pilots and some named individual airlines. That can't be allowed. If the data is properly rendered untraceable, then I think it must be released and should be released and will be released as I have stated several times.

So if it were properly anonymized, I have no concern.

Mr. HALL OF TEXAS. And they do that by cross referencing flight routes, times, and carriers?

Dr. GRIFFIN. We need to delete the fields that contain that information. So that will be done. Now, the major concern I would have over this data at this point is that somebody might put too much credence in it. It is simply not credible to believe that the aviation community is experiencing nearly four times the number of engine failures that are being documented by the FAA. That is not credible to believe. If it is true, it is going to require some very strong justification, and we will pursue that. The community will pursue that, but it is not credible at this point.

So I would not want the flying public to believe the data in the form that it appears today.

Mr. HALL OF TEXAS. Mr. Hall, wake up.

Mr. HALL. Yes, sir.

Mr. HALL OF TEXAS. NASA surveys but one source of data that can be used to major safety transit and National Airspace System. What other sources can be used to monitor system safety, and how useful are they?

Mr. HALL. Well, the ASRS System, which NASA has used for years, is, of course, I think very useful in terms of it is a voluntary program. It is a program that—that is why I am a little confused on—in regard to some of the comments from the Administrator. NASA has run this program for the Federal Government for a number of years. So they are familiar with how to put a program together and maintain confidentiality.

There are other programs that run by FAA and, of course, NTSB has gotten into trying to look at as many incidents as possible in providing information. But aviation safety benefits from having, as I mentioned in my statement, sir, a very open system and a system where there is a whole lot of information and that information is constantly in the public for analysis and review.

Mr. HALL OF TEXAS. Dr. Griffin, you state that NASA will release this survey data so long as it doesn't compromise the anonymity of the pilots, keep them anonymous. Does that not contain confidential commercial information?

Dr. GRIFFIN. Well, by the time we release it, it will not contain confidential commercial information. Some of the data that we have today does, and we are not legally allowed to do that by statute.

You know, there have been a number of comparisons made to the Aviation System Reporting System, the ASRS, which NASA does manage by statute, and this survey. One of the primary differences between ASRS and this survey was that ASRS is managed by aviation specialists. When reports are made, the aviation specialists can contact the submitter of the report and ask follow-up questions. They are knowledgeable about aviation safety.

This survey was conducted by telephone polling surveyors, who have no knowledge or had no knowledge at all as to aviation or aviation safety. They had no domain expertise, and it is precisely that which has led to some of the problems that we are here discussing today.

Mr. HALL OF TEXAS. I think my time is up, Mr. Chairman. I thank you. I yield back if I have any.

Chairman GORDON. Thank you, Mr. Hall. Let me once again state that this is not a matter of a hearing between a safe system and an unsafe system. It is a matter of a very safe system that we want to, you know, make, continuing the model for the entire world.

Now we will recognize Mr. Costello, the Chairman of the Aviation Subcommittee of the Transportation and Infrastructure Committee.

Mr. COSTELLO. Thank you, Mr. Chairman, and thank you for calling this hearing today as well as the Chairman of the Subcommittee, Chairman Miller. Welcome, Dr. Griffin, Mr. Hall. Mr. Hall, it is good to see you in Science Committee room for a change as opposed to the T and I room.

But let me—we can go through a whole long list of questions. Let us cut to the chase and get down to why we are here.

GETTING THE INFORMATION TO THE PUBLIC

We talk about scrubbing the report in order for it to be released without breaking anyone's confidence or a commit——. You are saying that you can release the information possibly by the end of the year. Is that correct?

Dr. GRIFFIN. Yes, sir.

Mr. COSTELLO. How long will it take, I mean, if it is a priority in the agency, we all, and I would hope that you would acknowledge that the agency made a huge mistake in how they responded to the AP and to the media. Your spokesperson did, in fact, unless you are refuting this, did, in fact, say to the news media that, if we release the data it could be, could have an adverse affect on the industry. Is that correct, Dr. Griffin?

Dr. GRIFFIN. We did say that, and as I have now said several times, that was the wrong thing to have said. I apologize that anyone in my agency did say that.

Mr. COSTELLO. So you know that it was a mistake to say that. You know that it has created a lot of controversy. You know that people in the aviation industry and the traveling public, because I have heard from my constituents, and I have heard from complete strangers to me at airports as I am flying, what is going on with this report, and what won't you release it to the public?

If it is a priority to us, shouldn't it be a priority to your agency to scrub this and get it out to the public immediately?

Dr. GRIFFIN. It is a priority. I have spent, I have a Shuttle mission in the air right now, and I have spent little else this past week except to work on this issue. I regret——

Mr. COSTELLO. I would hope that there are other people in the agency that you could assign this to as opposed to you handling this personally.

Dr. GRIFFIN. Well, we have had quite a number of people working on it. We do consider it to be a priority, and we consider it to be an important one. Now, the fact that people at NASA misspoke concerning the reasons behind the denial of the FOIA request does not mean that we can compromise our statutory requirements——

Mr. COSTELLO. And no one is asking you——

Dr. GRIFFIN.—on FOIA.

Mr. COSTELLO.—compromise a statutory requirement.

Dr. GRIFFIN. Right.

Mr. COSTELLO. What we are saying is get this done and get it out to the public, and my question to you is do you have people today and this evening and around the clock working on this project to scrub it to get it out to the public?

Dr. GRIFFIN. The people who have to work on this project to scrub the data and get it to the—out to the public are at Battelle Institute. They have been directed to do that. I hope that they are doing that with all deliberate speed, and we will be verifying that. When Battelle has finished scrubbing it, the quality of the scrub must be judged by government officials, who will then do that as quickly as possible, and we will get it out to you.

Mr. COSTELLO. So have you directed Battelle to work on this around the clock? Have you given them a deadline?

Dr. GRIFFIN. I have not directed them to work on it around the clock. We have directed them to work on it.

Mr. COSTELLO. Isn't it reasonable for us to expect for you to give them a deadline? They are working for you.

Dr. GRIFFIN. They are, and we have asked them to complete it by the end of the year. That is what we are asking. That is two months away.

Mr. COSTELLO. And if you told them June of '08, they would complete it in June of '08. Isn't that correct?

Dr. GRIFFIN. You are asking for more detail than I have. It is a significant amount of data processing. We will do it as soon as we can, and we are trying for the end of the year.

Mr. COSTELLO. Dr. Griffin, you have acknowledged that the agency misspoke. They created this uproar with the American people and with the Congress and with everyone in this room. It is your responsibility to clean this up.

Dr. GRIFFIN. That is correct.

Mr. COSTELLO. If I were in your shoes, I would be directing Battelle to work 24 hours a day, seven days a week to get this thing cleaned up so it can be released to the public.

DISCIPLINARY ACTION FOR RESPONSIBLE PARTY

Last and final question that I have, the person who misspoke representing the agency, have you identified who that is?

Dr. GRIFFIN. Yes, sir.

Mr. COSTELLO. Have you taken any disciplinary action against that person?

Dr. GRIFFIN. It is not a matter of discipline. People make mistakes. This was a mistake.

Mr. COSTELLO. My question, we all understand it was a mistake. Has there been any disciplinary action taken?

Dr. GRIFFIN. No.

Mr. COSTELLO. Thank you, Mr. Chairman.

Chairman GORDON. The gentleman from Wisconsin, former Chairman of the Aviation Subcommittee on this committee, as well as the Full Committee, Mr. Sensenbrenner, is recognized.

Mr. SENSENBRENNER. Thank you very much.

NASA SURVEY AND CONFIDENTIALITY

Dr. Griffin, first of all, I think we all want to see what the results of the survey are. Secondly, I think we all agree that certain things have to be kept confidential. That was what was represented to the people who were asked to respond to the survey, and they responded candidly based upon the representation of confidentiality.

I guess what I would like to know is the survey was finished in 2005, and we are almost at the end of 2007. That is two and one-half years more or less between the time the survey was finished. Why is there this gap in time? Who dropped the ball?

Dr. GRIFFIN. We at NASA did not manage this project to its conclusion well. We did not. Because of that I have instituted a look at other projects that we are doing in various classes of research at NASA to make sure that we are not doing the same thing elsewhere.

Mr. SENSENBRENNER. Which NASA center of "excellence" supervised Battelle and this survey?

Dr. GRIFFIN. This particular project was supervised out of the Ames Research Center.

[The information follows:]

MATERIAL FOR THE RECORD

NASA Ames Research Center agrees that a more timely report on NAOMS should have been provided. The NAOMS contractor team consisted of a small group of individuals who supported a few related projects. The NASA NAOMS project management officials decided to allow the contractor team to defer preparing a timely report in order to conduct other activities in support of the NAOMS project, notably the transition of the NAOMS survey methodology, as well as to address priorities in other projects they were supporting. In the process, attention was diverted from the final report, resulting in an inordinately lengthy delay.

The NAOMS contractor completed the survey collection in December 2004. In FY 2005, the NASA NAOMS project management officials prioritized project resources to enable the transfer of the NAOMS methodology to a new host organization. This transfer required adapting the NAOMS data collection methodology from a computer-aided telephone interview to a web-based format. Throughout FY 2005 and FY 2006, the NAOMS contractor team was thus directed to develop the new methodology, in collaboration with NASA researchers, and to transfer the methodology to the Air Line Pilots Association (ALPA), under the auspices of the Joint Implementation Measurement and Data Team (JIMDAT, the evaluation arm of the Commercial Aviation Safety Team).

By early FY 2007, the NAOMS project team had not completed the transition of the methodology to ALFA nor had the contractor completed its final report. By this time, the contractor was needed to support the Aviation Safety Program priority to develop safety data mining tools. The NASA NAOMS project management officials, therefore, directed the contractor to focus on this priority and provided an extension to the contractor for producing a final report on NAOMS. Proper attention is now being given to producing this report, and measures will be taken to ensure that this kind of delay on contract deliverables does not happen in the future.

Mr. SENSENBRENNER. Okay. Have you found out why the Ames Research Center didn't follow up and have a timely report?

Dr. GRIFFIN. I have not.

Mr. SENSENBRENNER. Will you do it and let us know?

Dr. GRIFFIN. I will take that for the record. We will find out what their rationale was for taking so long to allow this report to be generated, and we will answer back to you.

Mr. SENSENBRENNER. Okay. Well, let me say that this appears to be a mess of NASA's own causing, and you are the agency head, and I would hope that we don't hear from you again on another mess of NASA's own causing.

You know, I would point out that in about two and a half years we are going to have a census in this country, and one of the things the Census Bureau represents to every American or everybody who is in this country, is that their responses will be confidential. And that is in order to get a candid response on not only how many people are here but the housing questions and the other things that are asked on the census form.

Any government agency that gets itself caught in a pickle like NASA is in is going to reduce the confidence of the American public that responses that are supposed to be kept confidential will indeed be kept confidential. Sir, you dug yourself into a hole. I can't say that you are not digging yourself deeper into the hole from what I have heard at this hearing, but I think it is important more than just for your agency but the government as a whole that you start working yourself out of that hole.

Thank you, and I yield back the balance of my time.

Chairman GORDON. The gentleman from Colorado, the Chairman of the Space and Aeronautics Subcommittee, Mr. Udall is recognized.

Mr. UDALL. Thank you, Mr. Chairman. Welcome, Dr. Griffin.

RELEASING INFORMATION AND WHY WAS THE SURVEY ENDED?

I would like to start by echoing what Chairman Gordon said today. We are all disappointed we have had to convene the hearing, but the fact that NASA refused to release the taxpayer-funded aviation safety survey and the rationale that NASA gave for refusing to release this information is unacceptable, and it obviously required Congressional scrutiny. I think we all agree the safety of the public has to be our first priority, especially with more and more Americans flying every year.

I am glad that you have now agreed to release at least some of the survey data publicly so that it can be used to help maintain and hopefully improve the safety of the Nation's airways, but I feel strongly that all of the data should be made publicly available as soon as possible.

I also have some concerns about why the study was ended. Several witnesses here today have affirmed the value of a comprehensive, ongoing survey and analysis approach to aviation safety trend analysis and accident precursor identification, which is the approach exemplified by the NAOMS Project. I think there appears that we would all agree to be a great deal of merit to the NAOMS approach, and we need to assess whether NASA and the FAA should reinstitute the project.

Doctor, if I could just leave aside for a moment the issue of peer review, survey methodologies, which our second panel will be addressing, I have to say that I am troubled by your testimony on the NAOMS project. At one point in the testimony you state that the project was not shut down prematurely and that the transition of the survey methodology to industry, government decision-makers was successfully completed.

However, later in your testimony you say that any product of the NAOMS Project including the survey methodology should not be viewed or considered at this stage as having been validated. Basically, at least to this Member, you are saying that NASA didn't complete a critically-important R&D task, the validation of the survey methodology before it transitioned NAOMS out of NASA.

Later Captain McVenes will testify that the Aviation Committee had plans to work with NASA to help determine if the survey data were reliable, but funding for NAOMS ran out, and that is when the A-L-P-A, ALPA, stepped in to help keep the project alive.

This doesn't appear to be the normal way R&D programs should be run, and I think that the Space and Aeronautics Subcommittee will need to take a closer look at NASA's aeronautics programs and its aviation safety programs in particular in the coming months. But in the spirit of openness and dialogue here, I would see if you care to respond to those comments.

Dr. GRIFFIN. Well, we certainly agree—could not agree more that the aviation safety information leading to trending analysis and accident factor identification before the fact is crucial. We are working on exactly those things in concert with the FAA, again, in a program that has been reviewed by the FAA's own safety subcommittee, in which we have submitted for review to the National Academy. So we agree with that.

NASA, however, is not the entity responsible or even allowed to take on the job of operational aviation safety. We do research, and we are doing that. And we expect to continue to do it, because we do believe it is important.

Now, as I said in my testimony earlier, the National Academy in its 2004, review specifically stated that they did not see a reason for the NAOMS Project to continue. We agree. We have transitioned our other projects of that type to a joint FAA, NASA arrangement that I think is working well, and when NAOMS was, as it was, scheduled to end in 2004, with follow-up reporting to be done in 2005, we allowed that to occur as had been planned.

So I don't think there are—I don't think there is any evil intent there. There was no intent to abrogate our responsibilities. In fact, our intent was to execute them as best we could with our FAA partner. What was not done here was to bring the project to a timely conclusion, to assess the data, to issue a report, to publish that report in peer review journals, and to release the data to the public in a timely way, properly anonymized. That was not done, and we are going to have to do it.

Mr. UDALL. The spirit in which I offer my remarks are as follows. I think this situation, of course, is one that we have great concern about on the Committee, but I think we should take advantage of the clear opportunity here to make our system safer and to take this data, 24,000 responses, that is very, very significant, and apply it and use it in a way that has some utility in the coming months and the coming years.

I see my time has expired. Thank you for being here today again.

Chairman GORDON. Dr. Ehlers, thanks for your being prompt today. I am sorry that I overlooked that earlier and Dr. Ehlers of Michigan is recognized for five minutes.

Mr. EHLERS. That is quite all right. I am used to being overlooked. I hope you all feel sorry for me.

AIRLINE SAFETY COMPARED TO OTHER SAFETY CONCERNS

Actually, I am going to take a somewhat different attack and also do some criticism but not of you, Dr. Griffin.

Your situation reminds me very much of a quote from Harry Truman when he left the Presidency. His comment was, “This job was not so great. I spent all of my time trying to persuade people to do things they should have had sense enough to do in the first place.” Your situation reminds me a bit of that, and I agree with the comment made that you have more important things to do than to deal with this particular problem, and it is unfortunate that it developed and entwined you in it.

But as the son of a preacher, I have to give a little sermon here, and I have been warned never to insult the media, but I am going to anyway. Because it has always puzzled me why the media are so obsessed with aviation safety when it is the safest mode of transportation in this country. I remember some years ago when I was new in the Congress but there was a low-cost airline that had an airplane crash in the Everglades because some attendant or some mechanic had loaded some oxygen units on the plane which shouldn’t have been there. Day after day, month after month this was headlines in the newspapers, and I pointed out repeatedly that the same day that airplane crashed, more people were killed in automobile accidents in this country than were killed in that airplane. Every day after that more people were killed on the highways than were killed in that plane crash. Yet headlines day after day.

The safety is better than any other mode of transportation. We should recognize that and participate in it. I don’t fault you whatsoever for things that may have gone wrong in this. You were caught in an unfortunate situation in responding to a FOIA request, which is a no no. But nevertheless, I think your motives here were very good.

I would also point out that if people are so concerned about safety, there is an immediate problem you can tackle with traffic accidents, and that is drunk drivers. We have had a number of drunk drivers kill individuals while we are sitting here in this session, more than were killed by airplanes. And it goes on year after year. In fact, so far—or—in any given year more individuals are killed by drunk drivers than were killed among our troops in the entire Iraq War up to this day. That is every year that happens, and yet we spend all this time on aviation safety.

I don't, I am not opposed to making airlines, airplanes as safe as they should be. I am a would-be pilot myself, and I certainly want a safe airplane and safe air traffic control system. But let us get over this obsession and let us recognize that our goal is to improve what is already very good and not get obsessed about little incidents that occur when we have much bigger problems to try to tackle in the aviation sector.

So I beg your apology for the sermon, Mr. Chairman, but I just have to say these things once in awhile. Let us get stuff in perspective, and the world is not going to rise or fall, and the aviation industry is not going to rise or fall on the results of this survey. I doubt if we will learn much different than we have learned from the previous surveys. It is all good. Let us all do it, but let us not overstate it.

Thank you very much. I yield back.

Chairman GORDON. Thank you, Dr. Ehlers. I hope you feel better.

The gentleman from Louisiana, Mr. Melancon, is recognized for five minutes. Melancon passes and let me see, Mr. Mitchell from Arizona, also on the Transportation Committee, is recognized.

Mr. MITCHELL. Thank you very much, Mr. Chairman. This is for Dr. Griffin.

You know, airline business in my particular district is a very, very serious business. One of the Nation's largest airlines is located in Tempe and Phoenix Sky Harbor is the eighth largest or busiest airport in the country. We depend on aviation, and we depend upon the Federal Government to keep our skies safe.

RESPONSIBILITY FOR PUBLIC STATEMENT

Now, I was stunned as most people were, and I think this is why we are here, because of the statement that came out that you have heard many times before—the affect of public—the reason the report was not released is because of the affect that it might have on the public confidence and so on.

Now you are telling us that you don't agree with that statement that was made last week. But, Dr. Griffin, you are the Administrator of NASA. How could this statement be released without first being reviewed and agreed upon as NASA's stance on this particular issue?

Dr. GRIFFIN. The delegated FOIA official released the response in the form of a letter and included a statement that I believed to have been mistaken. I try to review everything that I believe will be significant before it goes out, but I don't have enough hours in the day to review every single thing that goes out of NASA, and sometimes mistakes are made. This was one, and when that occurs, as the agency had, I pay the price for it.

Mr. MITCHELL. But you have the time now to come and——

Dr. GRIFFIN. Obviously I have had to make the time, because we did make a mistake, and the mistake rests on my shoulders, and I apologize for it, and I have before, and I will again. The language that was used was inappropriate. We will not repeat it. We will correct the error. We will de-identify the data, and we will release it.

Mr. MITCHELL. Well, besides this particular statement I would hope that you would have a better review of what comes out of your office, because you may be back here again the way things seem, doing the same thing you are doing now.

WHY WASN'T NASA INFORMATION MADE PUBLIC AND WHY DIDN'T IT LIVE UP TO NASA'S STANDARDS?

You know, you said that NASA is interested in getting this safety information out, and my question is why has NASA refused to produce it to the Associated Press for a year? Now, my understanding is the study started in April of 2001, ended in December, 2004. Why does it take a hearing in Congress and public pressure for a hearing to get the public made—to get this information made public?

Dr. GRIFFIN. As I said earlier, the only way that I can answer that question is to admit, as I have, that we did not manage that project well. We did not bring it to a timely conclusion. We did not publish the data and the report's conclusions in an appropriate way, and we will fix it, and we will try not to do it again.

Mr. MITCHELL. The next part of this question is you stated that this was not conducted—this survey under proper standards of NASA. So it seems like there has been a lot of mistakes here. And this is one of them you say it wasn't under NASA's normal review.

Why would NASA invest over $11 million in a project like this if it didn't follow NASA standards?

Dr. GRIFFIN. We did not manage the project well. We did not supervise our contractor appropriately. We made a mistake.

Mr. MITCHELL. You know, all of this reflects on NASA's credibility.

Dr. GRIFFIN. Yes, sir, I do.

Mr. MITCHELL. I yield back.

Dr. GRIFFIN. I deeply regret the situation, and I will look, and we are now looking to make sure that this does not occur again.

Chairman GORDON. Thank you. We are going to be having votes in about 20 minutes, so I am going to, I want everybody to have their say. I will be stricter than usual on the five minutes, and if you want to be briefer than usual, then that would be good, too.

So, Mr. Bonner from Alabama is recognized.

STATE OF CURRENT SPACE SHUTTLE MISSION

Mr. BONNER. Thank you, Mr. Chairman, and I could probably spend the next five minutes trying to think of some creative way to ask the same question that has been asked repeatedly to get a different answer, but instead, if I might, I would like to ask, take advantage of this opportunity that we don't often have to ask Dr. Griffin how the Shuttle mission is going. Because I think a lot of people are interested. We have followed that with great interest over the years, and I think it would be great to hear from you on how it is going at this point.

Dr. GRIFFIN. It is going extremely well. We have an unfortunate rip in one of the solar arrays, not a huge rip, but a rip, and that is important to repair before the crew returns. And so we are going to extend the mission an extra couple of days to do that. But other than that it is going extremely well.

Mr. BONNER. Do you feel personally responsible for that solar rip?

Dr. GRIFFIN. You know, I am an ex-program manager, and my belief is if lightening strikes your payload, it is your fault. So, yes, I feel responsible for that rip, and we are, and for repairing it, and we are going to fix it.

Mr. BONNER. Thank you very much. Thank you, Mr. Chairman.

Chairman GORDON. Thank you, Mr. Bonner, and the Chairman of our Oversight Committee, Mr. Miller, is recognized.

QUALITY OF DATA

Mr. MILLER. Thank you, Mr. Chairman. Dr. Griffin, good afternoon. The next panel includes Dr. Robert Dodd, who was a principle investigator for the NAOMS Project. Have you discussed your testimony with Dr. Dodd at all? Have you reviewed his testimony?

Dr. GRIFFIN. No, I have not——

Mr. MILLER. Okay.

Dr. GRIFFIN.—met your next two witnesses.

Mr. MILLER. His prepared testimony says that the NAOMS Team made an extraordinary effort to clean and validate the data collected through the survey. The resulting data is of good quality and ready for meaningful analysis. You disagree with Dr. Dodd?

Dr. GRIFFIN. I do disagree with that statement.

Mr. MILLER. Okay.

Dr. GRIFFIN. The self-assertion by the purveyors of the data that the data is okay does not make it okay.

Mr. MILLER. Okay. Well, that was another, I mean, I understand a concern for methodology, but there does need to be an extraordinary concern for methodology. Dr. Dodd's statement of the purpose of NAOMS was help identify risks that could result in losses, evaluate the impact of new technology, provide insights into how well the safety enhancements are working out. In other words, provide results based upon which we could act.

And your testimony is that the overarching goal of developing, was developing methods to facilitate a data-driven approach to aviation system safety analysis, that in early 2005, you determined that the amount of data collected was sufficient to evaluate, whether NAOMS survey methodology was statistically useful. There were 29,000 survey results. I would hope that that would be enough in representative. And then you said—you have said in your testimony that it was not prematurely ended. It sounds from your testimony like the purpose of the project was to develop a methodology.

It seems like $11.3 million is a lot for methodology. That ought to buy you a lot of methodology. Was it your purpose to do the things that Dr. Dodd said, which is have information that you could use?

Dr. GRIFFIN. Well, from NASA's perspective the purpose was to develop and validate methodologies and then to transition the work to the agencies with operational responsibility.

Mr. MILLER. Okay. And when did that transfer happen?

Dr. GRIFFIN. The transfer of methodology and data to the Air Line Pilots Association, which had expressed some interest in a web-based version of the survey, occurred in 2004, 2005, and 2006. NASA has briefed the results of the study to the FAA, among other government agencies.

Mr. MILLER. So it has been analyzed to that extent?

Dr. GRIFFIN. It has been analyzed to that extent, and that analysis that you refer to that has been done to that extent revealed substantial concerns. For example, if you were—if you extrapolate the rate of certain things done, revealed by the survey, you get an uncredible answer.

For example, pilots were asked how often they had to land an airplane at an unscheduled airport in order to deal with an unruly passenger. We accumulated those statistics. If those statistics are extrapolated forward, it yields a result that four times a day a transport aircraft is landing because the crew has to deal with an unruly passenger.

Now, I recall since 9–11 that that has happened maybe two or three times.

Mr. MILLER. Okay.

Dr. GRIFFIN. If we had people landing four times per day to deal with an unruly passenger, it would be on the nightly news every night. That is not happening. So it causes us to suspect the quality of this data.

Mr. MILLER. All right. Dr. Griffin, I understand that the Office of Management Budget has an office of experts, of survey experts, survey methodology is not unusual. It is widely used in the Federal Government. It is widely used in social sciences. It is widely used. Survey experts and statisticians who review the methodology of all surveys used by the Federal Government. Was this survey reviewed by that office of OMB?

Dr. GRIFFIN. I don't know. I was not at NASA when that work was done, and so I don't know if it was reviewed by the OMB at that time or not.

Mr. MILLER. All right. You cite as still correct the refusal to provide the information under FOIA as revealing confidential commercial information. My understanding of that exception is that that is to protect the confidentiality of information provided by a business entity that might be confidential for business reasons. Market information, financial information, et cetera.

It is hard to see how this survey data provided by pilots would meet that exception. What kinds of confidential commercial information did this survey produce?

Dr. GRIFFIN. Well, the exemption that you refer to is, of course, correct as you state, but it is not the only one. In the case where information is voluntarily provided and when that information would not be customarily provided to the public, then we also have an obligation to protect that information.

Chairman GORDON. The gentleman's time has expired.

Mr. Inglis is recognized.

Mr. INGLIS. I pass, Mr. Chairman.

Chairman GORDON. The gentleman, Mr.—thank you. And is there—Mr. Lipinski. Excuse me. Mr. Chandler is next, then Mr. Lipinski and——

THE RESPONSIBILITY FOR THE $11 MILLION

Mr. CHANDLER. Dr. Griffin, I have been listening to the testimony, and I understand that, it sounds to me like you may believe you all made a mistake.

Dr. GRIFFIN. I have admitted it several times.

Mr. CHANDLER. I think that has come out in this hearing. And I understand that has to do with the handling of the FOIA request.

Dr. GRIFFIN. Yes, sir.

Mr. CHANDLER. But I also just—it just came across my mind that maybe you believe that this entire process has been mishandled, and you have made a mistake in the entire survey process and not overseeing what is a pretty enormous project. Is that the case as well?

Dr. GRIFFIN. I have—this is not an enormous project by NASA's standards.

Mr. CHANDLER. No, but in this particular instance it is a pretty important project.

Dr. GRIFFIN. But when we spend $11 million of the taxpayers' money it should be done well, and I have stated—I regret to state it, but I have stated that by my standards we did not manage this project well. We did not manage our contractor well.

Mr. CHANDLER. And you are also saying that at the end of all of this and when this data is, in fact, released, there is going to be reason to not have much confidence in the ultimate data. Is that correct?

Dr. GRIFFIN. I have been a pilot for decades. Anyone who knows anything about aviation is going to look at this data and have a lot of questions about it because it is on its face—on its face, when you look at it, you can extract from it conclusions which are not credible.

Mr. CHANDLER. Well, what I am hearing you say is we have just thrown $11 million down a rat hole.

Dr. GRIFFIN. I hope that is not the case, and I believe that we should be able to get much that is useful from this data, but there will be cause to question it by knowledgeable aviation experts.

Chairman GORDON. Would my friend yield to Mr. Lipinski so we can try to finish this panel?

Mr. CHANDLER. Sure. Thank you, Mr. Chairman.

Chairman GORDON. Thank you.

Mr. LIPINSKI. I will try to make this quick, although this is very important. Airline safety is critical. I have an airport in my district, O'Hara Airport very close proximity. I just want to zero in, Dr. Griffin, I have a lot of respect for you. Today you are on the hot seat, deservedly so with this project.

You talk about this project was not managed well. To me I look and see the project started six years, $11 million, no results. It could mean one of two things. Either complete incompetence, that this project had so many problems with it, that you couldn't get anything good out of it, or, you know, I could use the word cover up, I will say, but there, or there is some reason that this was stopped. There was something that, for some reason someone did not want to show up.

When this stopped, were there plans for anyone else to be surveyed after you did the airline pilots? Was there anyone else after that?

Dr. GRIFFIN. No. There was not. This project——

Mr. LIPINSKI. Was that the end?

Dr. GRIFFIN.—in the original material, which has been submitted to this committee, documenting this project, it was intended that the project be ended in 2004. We have for purposes of transition and simply because things have gone slower than they should have, this project has continued onto the present day. But there has been no cover up. There is no desire to conceal anything.

Mr. LIPINSKI. Okay. I am very——

Chairman GORDON. Mr. Lipinski, would you mind yielding to Ms.——

Mr. LIPINSKI. Yes, I will yield.

Chairman GORDON.—Richardson to, for her concluding statement?

Ms. RICHARDSON. Thank you, Mr. Chairman. I will just be very brief or as quick as I possibly can.

Dr. Griffin, I represent the California area, and we have had several reported incidences within the LAX Airport, and I also represent the Long Beach Airport. I have the following questions, and if you can't answer them within the time we have provided, you can provide them to this committee.

DATA RECOVERY, PEER REVIEW, AND AVOIDANCE OF REQUESTS

Number one, who and when decided that there would be a destruction of data requested? In your statement you say that that didn't happen, and so my question to you would be if it didn't happen, then why was it requested that the subcontractor—why were they directed to recover data? It just doesn't make sense. If they weren't required to destruct it, then they should now be required to recover it.

Chairman GORDON. If the gentle lady, would you go ahead and read your questions and then Dr. Griffin can respond for the record if that is okay.

Dr. GRIFFIN. We will take them for the record. Yeah.

Ms. RICHARDSON. The second thing is if the project was initiated in 1998, started collection in April of 2001, and started that in 2004, I find it really hard to understand, number one, why in seven, eight years you failed to complete a peer review, why we now suddenly question the methodology. I come from the private sector. I don't know of anyone who manages a project that you don't look at the data, how the data is being collected, how is it being presented, how are you going to use it, what should be included, what should not be included. That we finally wake up eight years later? I have never—I don't know of a system of how we do this and we operate it.

And then finally, I would say really the continued avoidance of requests is just unprofessional. I am a new Member here, but I will tell you what I call it. I don't call it a mistake. I call it negligence, and I really think that NASA is liable, and if something happens, this is a very serious issue, and I really resent that we are here today even having this discussion. This is something that could have been dealt with, I believe, if you really wanted it to. And for me to say two months is completely unacceptable. These are computer programs, you either make it a priority or you don't, and it seems to me today it is not a priority to you.

Thank you.

[The information follows:]

MATERIAL FOR THE RECORD

NASA Ames Contracting Officer issued the phase-out instruction to Battelle Inc. on September 10, 2007, via a new task request; this task instruction was made in preparation for task phase-out scheduled for October 31, 2007. Per this task instruction, written in order to properly disposition sensitive government information, the Ames Contracting Officer instructed Battelle Inc. to collect, inventory, archive, and transfer the complete set of data to the government. Once Battelle Inc. completed this transfer, and the NASA project management officials verified the completeness of the data set, Battelle Inc. was instructed to securely dispose of all data. This instruction was to ensure that the data set was NASA-owned and to prevent the potential for unauthorized use of the data.

NASA received a letter, dated October 22, 2007, jointly signed by Chairman Gordon, House Science and Technology Committee, Chairman Udall, House Space and Aeronautics Subcommittee, and Chairman Miller, House Investigations and Oversight Subcommittee, directing that NASA halt any destruction of records related to the NAOMS project. To comply with the direction, the Ames Contracting Officer directed the contractor to halt the phase-out process until further notice. This action was done via a task modification dated November 5, 2007.

NASA Ames Research Center agrees that the methodology should have been peer-reviewed much earlier in its development. While the survey was approved by the OMB in accordance with the *Paperwork Reduction Act,* and briefed to stakeholders in two workshops, the work was not peer-reviewed.

From 1998 to 2004, the NAOMS project team gave approximately 17 Power Point briefings to various audiences, mainly government and industry personnel. However, none of the research conducted in the NAOMS project has been peer-reviewed to date. Power Point briefings to stakeholders, while having some value, do not constitute peer review. Accordingly, no product of the NAOMS project, including the survey methodology, the survey data, and any analysis of those data, should be viewed or considered at this stage as having been validated.

It should be noted that NASA's assertion that none of results from the NAOMS project can be considered validated does not mean that NASA is drawing conclusions about the validity of the survey data; we are simply stating that no such conclusions can be credibly drawn.

In order to rectify this situation as best as possible, NASA has asked the National Academies to conduct an independent assessment of the contractor's final report as well as of the survey results that are to be publicly released. The National Academies' assessment will be made available to the public as soon as it is completed.

Mr. HALL OF TEXAS. Mr. Chairman.

Chairman GORDON. Yes, Mr. Hall.

Mr. HALL OF TEXAS. Could I make an inquiry of——

Chairman GORDON. Certainly.

Mr. HALL OF TEXAS. Mike, would you mind staying around during the second panel where we might respond to anything else that might happen? You know, something may come up as to whether or not we have handled immigration well, you know, the whole Congress might get indicted on that. We may have some questions on why we don't have an appropriations bill for the first time in history. A lot of us haven't handled things well, and you have said that you haven't, you acknowledged it. Please stay around, if you would, for this next—to where we can inquire of you for some answers if we need them. Would you?

Dr. GRIFFIN. Of course. Yes, sir.

Mr. HALL OF TEXAS. Thank you.

Chairman GORDON. Mr. Hall of Tennessee, thank you for being here. Dr. Griffin, you are a good Administrator of NASA, the buck stops with you. It is unfortunate you have to spend this time. I hope the message goes out to those folks that work for you that they should not put you in this position in the future.

We will take a recess to go vote and then come back for our second panel shortly.

[Recess.]

Chairman GORDON. As a courtesy to our witnesses if everyone would come back and be ready to go we will get started when Mr. Hall arrives.

I have been informed that Mr. Hall is on his way, and we are going to assume that it is his pleasure that we do not hold you up any more than necessary, so we will go ahead and proceed.

We don't have control over when votes occur. Sorry to hold you up. This is an important hearing, and we do want to proceed.

So at this time I will introduce our second panel of witnesses. Dr. Robert S. Dodd is the Safety Consultant and President of Dodd and Associates, LLC. Next, Dr. Jon Krosnick is the Frederic O. Glover Professor in Humanities and Social Science at Stanford University, and our last witness on this second panel is Dr. or rather, excuse me, Captain Terry McVenes, who is the Executive Air Safety Chairman of the Air Line Pilots Association.

Welcome to all of you. As you know, we hope that you will submit your full testimony and summarize it in five minutes if that is possible. If not, we do not want to interfere with a good hearing today.

And so, Dr. Dodd, the microphone is yours.

Panel 2:

STATEMENT OF DR. ROBERT S. DODD, SAFETY CONSULTANT AND PRESIDENT, DODD & ASSOCIATES, LLC

Dr. DODD. Thank you. Good afternoon, Mr. Chairman and Members of the Committee. My name is Dr. Robert Dodd, and I appreciate the opportunity to address the Committee on the NAOMS Project.

For seven years I served as the principal investigator for NAOMS. I consider myself extremely fortunate to have been involved with NAOMS. This was a unique project based on thorough preparation and outstanding science.

NASA managers provided the research team with the support and leadership needed to design and conduct an exceptional project. The research team itself was composed of an extremely well-qualified and knowledgeable group of scientists whose commitment to the project was unparalleled.

Finally and most importantly, I must acknowledge the commitment and effort of the hundreds of professional and general aviation pilots who helped design the survey and the 29,000 pilots who donated over 14,000 hours of their time to tell us about their safety experiences in an effort to improve the safety of the Nation's air transportation system.

When I learned that NASA had decided the data collected by NAOMS would not be released to the public, I was disappointed and perplexed. I have seen many reasons cited for why NASA decided these data should not be released. The press reported that NASA was concerned that the data might frighten airline passengers, and this would have a negative affect on the well being of the airlines.

Other aviation organizations claim that the NAOMS data were soft data and voluntarily submitted. The implication was that the NAOMS data were somehow of limited or no value because they originated with pilots who were voluntarily responding to a survey.

Finally, there are press reports that stated NAOMS data were not needed because current FAA oversight systems provided an adequate picture of the safety performance of the aviation system. I don't agree with these perspectives.

I believe the American public understands and accepts that travel by commercial airlines in the United States is the safest mode of travel in the world. Major air carrier crashes are thankfully rare events. I don't believe based on my experience that the NAOMS data contained any information that would increase the passengers' fear of flying.

NAOMS data, which were collected to help insure that the U. S. airline safety remains best in the world, should be released so it can be used for its intended purpose.

I would like to encourage the Committee to consider why a program like NAOMS is currently not operating. In most other aspects of public health and safety, U.S. Government and industry organizations routinely use surveys to identify and understand risks. Many of these programs have been in existence for years and are essential to effective oversight and evaluations of the Nation's safety and health programs.

A program like NAOMS can help identify risks by obtaining information from those who should know, the people operating the system. It can also help evaluate the safety impact of new technologies as they are introduced. This is an important consideration in light of all the changes occurring in the aviation system on a daily basis and especially when we consider the new technologies such as the air traffic control overhaul, which is going to be coming shortly.

Finally, an NAOMS-like program can provide quick insight into how well safety enhancements and improvements are working, a capability difficult to duplicate with today's aviation safety oversight systems.

In closing, I believe that NAOMS should be restarted and operated by an independent and unbiased organization. Such a program should receive funding directly from Congress to insure its budget remains adequate to fulfill its mission.

I appreciate the opportunity to comment on this important program.

[The prepared statement of Dr. Dodd follows:]

PREPARED STATEMENT OF ROBERT S. DODD

Good afternoon Mr. Chairman, Members of the Committee. My name is Dr. Robert Dodd and I appreciate the opportunity to address the Committee on the National Aeronautics Operations Monitoring System, also known as NAOMS.

Between February 1998 and March 2005, a period of seven years, I served as the principal investigator for the NAOMS project. I participated in all aspects of the survey including its design, application, data analysis and project management, often in collaboration with Mr. Loren Rosenthal, the Battelle Project Manager for NAOMS. Battelle was the prime contractor for the project.

I consider myself extremely fortunate to have been involved with NAOMS. This was a unique project based on thorough preparation and outstanding science. NASA managers provided the research team with the support and leadership needed to design and conduct an absolutely outstanding project. The research team itself was composed of an extremely well qualified and knowledgeable group of scientists whose commitment to the project was unparalleled. Finally and most importantly, I must acknowledge the commitment and effort of the hundreds of professional and general aviation pilots who helped us design the survey and the 24,000 pilots who donated over 12,000 hours of their time to tell us about their safety experiences in an effort to improve the safety of the Nation's air transportation system.

I was disappointed and perplexed when I learned that NASA decided the data collected by the NAOMS survey would not be released to the public. While I know that the most notable denial was that issued to the Associated Press, the Johns Hopkins University Center for Injury Research and Policy, a reputable safety research organization in addition to be a leading scholarly institution, was also denied.

Many different reasons were cited for NASA's refusal to release these data to the public. The press reported that NASA was concerned that the data might "frighten airline passengers" and this would have "a negative effect on the well being of the airlines." Press reports also indicted that other aviation organizations claimed that the NAOMS data were "soft data" and voluntarily submitted. The implication was that the NAOMS data were somehow of limited, or no value, because they originated with pilots voluntarily responding to a survey. Finally, there were press reports that stated NAOMS data were not needed because current FAA oversight systems provided an adequate picture of the safety performance of the National Airspace System.

I find these arguments without merit.

I believe the American public understands and accepts that travel by commercial airlines in the United States is the safest mode of travel in the world. Major air carrier crashes are thankfully rare events. When a major crash occurs, it receives exceptional press coverage throughout the world, usually with images of destruction and chaos. Yet passengers continue to fly. I don't believe that the NAOMS data contained any information that could compare with the image of a crashed air carrier airplane or would increase passengers' fear of flying.

I also don't believe the argument that NAOMS data are somehow limited or of no value because they are derived from a survey has merit. All data used for analysis, no matter its origin, have limitations and errors. Based on my experience, most if not all the databases used by the FAA for safety oversight and analysis contain errors and have limitations. This is why knowledgeable scientists and experts are involved in turning these data into useful information for decision makers. NAOMS data are no different in this regard. The NAOMS team made an extraordinary effort to clean and validate the data collected through the survey. The resulting data is of good quality and ready for meaningful analysis. Why would anyone decide that additional information, especially when it deals with the safety of the traveling public, should be hidden?

Finally, the belief that the NAOMS data are not needed because current safety oversight systems are adequate is untrue. Not all airlines have Flight Operational Quality Assessment (FOQA) programs or participate in the Aviation Safety Action Program (ASAP), a pilot based voluntary reporting system. Further, current safety oversight systems do not do a good job of measuring safety errors in the general aviation fleet, among small commercial operators, or among maintenance technicians, all of which have a direct influence on airline safety. A program like NAOMS can provide a unique oversight capability for all of the aviation system.

In closing I would like to encourage the Committee to consider why a program like NAOMS is not currently operating. In most other aspects of public health and safety, U.S. Government and industry organizations routinely use surveys to identify and understand risks to public safety and health. Many of these programs have been in existence for years and are central to the evaluation and oversight of the Nation's health and safety.

A program like NAOMS can:

1. Help identify risks before they result in losses by obtaining information from those who are in the best position to know, the people operating the system.

2. Help evaluate the impact of new technology, an important consideration in light of all the changes occurring in the National Airspace System including the overhaul of the air traffic control system.
3. Provide quick insight into how well safety enhancements and improvements are working, a capability difficult to duplicate with today's oversight systems.

I believe NAOMS should be reinstituted and operated by an independent and unbiased organization. Such a program should receive funding directly from Congress to ensure its budget remains adequate to fulfill its mission.

Thank you for the opportunity to comment on this important issue.

BIOGRAPHY FOR ROBERT S. DODD

WORK EXPERIENCE

Johns Hopkins University School of Public Health, Baltimore, MD; 1/2004–Present

Adjunct Faculty

I teach a course at the Johns Hopkins University Bloomberg School of Public Health titled Transportation Research, Public Policy and Politics. This is a graduate level course. This course is intended to provide an overview of the significant role of national politics on transportation safety policy in the United States. Using case studies of notable safety enhancement efforts in aviation, highway, rail and maritime transportation, the students are introduced to the significant roles and interactions of lobbyists, industry associations, politicians, and federal agencies in transportation safety research and subsequent safety improvement rule-making. Through lectures, readings and a field trip, students learn that transportation safety and injury prevention improvements often require significant efforts to successfully navigate the path from research findings to interventions that improve the traveling public's safety and health.

Dodd & Associates, LLC, Gambrills, MD; 6/1998–Present

Owner

Dodd & Associates, LLC is a consulting company that specializes in transportation safety research and analysis. As owner, I serve as the senior research scientist and manager. Our business focus includes transportation safety research, data analysis, research design, survey research, transportation injury control assessments, safety program design, safety training, safety audits and analysis, and OSHA compliance assessments.

I serve as a research scientist on research projects for the Federal Government and private clients. In many of the projects, I have served as the principle investigator. Consequently, I am usually responsible for developing project proposals and the research protocol, project work plans and time lines, managing project participants, writing the final reports and presenting the findings to the client and other organizations as required. I am knowledgeable about government contracting and grant procedures as a result my extensive experience in managing such programs both as a contract and grant recipient.

A sample of projects include:

Principal Investigator, National Aviation Operations Monitoring Service (NAOMS): Multi-year, multi-million dollar survey study that collected information on safety incidents from over 22,000 air line pilots and 4,000 small airplane pilots. Study was conducted for NASA. I oversaw experimental development, testing and application of the project research plan and survey. The surveys were conducted via telephone and achieved an 80 percent response rate. The project is now complete and papers are being written for peer review journals.

Principal Investigator, Wide Area Augmentation System (WAAS): This research project was designed to quantify in dollars saved by the potential reduction in crashes associated with the planned introduction of the wide area augmentation system (WAAS) navigation system. The WAAS is a satellite-based navigation system developed by the Federal Aviation Administration (FAA) to provide precision approach capability to the majority of airports in the continental United States. The project was conducted for the FAA and resulted in a report for FAA use.

Co-Principle Investigator, Evaluation of the Use of Common Denominators for Cross Modal Transportation Safety Evaluation: I served as a co-principal investigator with Professor Susan Baker on a Johns Hopkins University research project to evaluate the feasibility of using common exposure measures for cross-modal evaluations in transportation safety evaluations. This study was sponsored by the Bureau of Transportation Statistics which is part of the Department of Transportation.

Audit Team Leader, Patient Transport System Operational Safety Audits: I lead a team of experts who evaluate the safety of patient transport operations (both ground and air) for medical transport services. We have completed over 65 audits to date. Focus of audits included patient safety, occupational safety and transport operations.

Records Management Systems, Incorporated, Fairfax, VA; 3/1996–6/1998

Senior Research Scientist

I served as a senior research scientist for RMA, a government contractor supporting the Federal Aviation Administration's (FAA) Office of Aviation Safety. I conducted safety research, assisted in the design of database and safety analysis systems for the FAA's National Aviation Safety Data Analysis System (NASDAC) and helped develop safety programs. I participated in strategic planning, helped design research protocols and project management plans, and participated in industry meetings for the FAA.

A key component of NASDAC's mission at that time was the evaluation and integration of aviation data safety systems into a common access point for analysis. These data systems were owned and operated by the FAA, the National Transportation Safety Board (NTSB), the National Aeronautics and Space Administration (NASA), the British Civil Aviation Authority (CAA), and private data sources such as AirClaims. As the primary analyst supporting the NASDAC's mission, I became very familiar with these data sources. My familiarity originated with using these data for analytical projects and evaluating the databases for accuracy, structure, relevancy to current safety issues and much more. Through this experience, I became expert in the strengths and limitations of these data sets.

Battelle Memorial Institute, Columbus, OH; 5/1990–3/1996

Principal Research Scientist

I supported Battelle's transportation group conducting research and participating as a Battelle representative in meetings and conferences held in Washington D.C. I also supported the FAA's Aviation Safety Reporting Program (ASRS), a voluntary aviation incident reporting system, by conducting analysis of the data contained in the ASRS database. I conducted analysis, generated reports, and presented findings of interest to both government and industry organizations.

Johns Hopkins University School of Public Health, Baltimore, MD; 8/1988–5/1990

Research Assistant

I was a teaching and research assistant while a full-time doctoral student. As such, I assisted professors in the research activities conducing database design, development and research. I also assisted in teaching courses.

National Transportation Safety Board, Washington, DC—7/1986–8/1988

Transportation Safety Specialist

I was a transportation safety specialist and worked in the safety studies division. I was responsible for conducting targeted research investigations of specific transportation safety issues, writing summary reports and generating corrective recommendations. I assisted in crash investigations and statistical evaluations. I also participated in industry meetings, wrote speeches for individual Board members and made public presentations. I left this position to return to school for my doctorate.

Air Line Pilots Association, Herndon, VA; 6/1980–7/1986

Staff Safety Engineer

As a staff member of the Engineering and Air Safety Department, I supported pilot safety committees and worked on safety issues involving crash survival, airport design and airport safety. Part of my duties involved responding to FAA Notices of Proposed Rule-making (NPRM) for safety regulation rule changes. I also worked closely with the FAA and NTSB on a broad variety of air carrier safety issues. I also managed safety committees for the Association, participated in industry working groups sponsored by the Society of Automotive Engineers, National Fire Protection Association, American Association of Airport Executives and similar organizations.

Freeway Airport Inc., Mitchellville, MD; 12/1978–6/1980

Flight Instructor

As a charter pilot and flight instructor I was responsible for conducting air taxi flights for customers and training primary, advanced and instrument pilots.

EDUCATION

Johns Hopkins University School of Public Health, Baltimore, MD; Doctorate, 5/1992; Major: Public Health; Minor: Behavioral Science

Relevant Course Work, Licensures and Certifications:

This course of study was research-oriented and predominantly quantitative and lead to a Doctorate of Science (Sc.D). It included study of statistics, epidemiology, experimental design, survey design and application, database design, transportation safety and research methodology. The main focus was transportation injury prevention and occupational safety, with secondary study in the behavioral sciences. This focus included injury coding and outcome measurement, and observational study design. My thesis evaluated occupant crash survival and was titled "Factors Related to Occupant Crash Survival in Emergency Medical Service Helicopters."

University of Southern California, Los Angeles, CA; Master's Degree, 12/1981; Major: Safety

Relevant Course Work, Licensures and Certifications:

This degree program used an interdisciplinary systems approach to the theory and application of modern transportation safety practice. The curriculum included study in management, technology application, human factors, accident investigation, risk management, system safety, environment and communications. Focus areas for my specific course of study included: structural safety and failure analysis, accident investigation, human factors, system safety engineering, statistical analysis, and experimental design in safety research.

University of Maryland, College Park, MD; Bachelor's Degree, 12/1978; 128 Semester Hours; Major: General Studies

Relevant Course Work, Licensures and Certifications:

This course of study led to an independent studies degree with the main focus on the life sciences, including courses in micro biology, zoology, physiology, chemistry, and anatomy.

AFFILIATIONS

Association of Air Medical Services, Member, Board of Directors

American Society of Safety Engineers, Professional Member

American Public Health Association, Professional Member

PROFESSIONAL PUBLICATIONS

Scott A, Krosnick J, Dodd R, et al., Comparing Telephone Interviews with Self-Administered Mailed Questionnaires: Results from a Field Experiment Assessing Reporting Accuracy. *Public Opinion Quarterly,* submitted.

Baker S, Grabowski J, Dodd R, et al., EMS Helicopter Crashes: What Influences Fatal Outcome? *Annals of Emergency Medicine,* April 2006 (Vol. 47, Issue 4, Pages 351–356).

Enders J, Dodd R, Fickeisen F, Continuing Airworthiness Risk Evaluation, *Flight Safety Digest,* Flight Safety Foundation, Sept–Oct 1999, Arlington, VA.

Enders J, Dodd R, et al., A Study of Airport Safety With Respect to Available Approach and Landing Aids, *Flight Safety Digest,* Flight Safety Foundation, Nov. 1995.

Baker SP, Lamb M, Dodd R, *Crashes of Instructional Flights, Analysis of Cases and Remedial Approaches,* FAA Grant Report #93–G–045, Johns Hopkins Center for Injury Research and Policy, Baltimore, MD, Oct. 1994.

Dodd R, The Cost-Effectiveness of Air Medical Helicopter Crash Survival Enhancements, *Air Medical Journal,* 13:7, July 1994.

Baker SP, Lamb MW, Li G, Dodd R, Human Factors in Crashes of Commuter Airplanes, *Aviation Space and Environmental Medicine,* 193, May; 64(5):417.

Dodd R, *Occupant Survival In Emergency Medical Service Helicopter Crashes,* Transportation Research Record of the National Research Council, 1992.

Dodd R, ASRS: An Under used Resource, *The Journal of Air Medical Transport,* Vol. 10, No. 10, Oct. 1991.

Eldredge D, Dodd R, Mangold S, *Categorization and Classification of Flight Management System Incidents Reported to The Aviation Safety Reporting System,* Battelle Memorial Institute, Columbus, OH, Contract No. DRTS–57–89–D00086, June 1991.

Dodd R, Reporting Accident Rates per 100,000 Patient Transports Responsible Technique, letter to the editor, *The Journal of Air Medical Transport,* Vol. 10, No. 2, Feb.

ADDITIONAL INFORMATION

- Adjunct Faculty, Johns Hopkins University Bloomberg School of Public Health, Center for Injury Research and Evaluation
- John W. Hill Safety Scholarship, University of Georgia
- William Haddon Fellowship in Injury Control, Insurance Institute for Highway Safety
- Graduate Research Award Program, Public-Sector Aviation Issues, Transportation Research Board, National Academy of Sciences
- Outstanding Performance Award, National Transportation Safety Board
- At-Large Member, Board of Directors, Association of Air Medical Services
- Chair of the Safety Committee, Association of Air Medical Services
- Airline transport rated multi-engine pilot (ATP–ME)

Chairman GORDON. Thank you very much, Dr. Dodd.

Our next witness, please proceed.

STATEMENT OF DR. JON A. KROSNICK, FREDERIC O. GLOVER PROFESSOR IN HUMANITIES AND SOCIAL SCIENCES, STANFORD UNIVERSITY

Dr. KROSNICK. Thank you. Mr. Chairman, thank you for the opportunity to testify today. I am a Professor at Stanford University with expertise in psychology and political science, and I have devoted most of my career to the study and use of survey methodology. I have conducted more than 100 surveys and have conducted research to identify best practices in the design of surveys. I have written more than 350 research papers and received 65 grants and contracts to support my research, mostly from the Federal Government.

I have written a textbook in this area, and as an expert on survey methods, I have advised many federal agencies on how to conduct their surveys, including the GAO, the IRS, the CIA, the NIH, NOAA, EPA, the Census Bureau, the Bureau of Labor Statistics, CDC, and others.

I am here to thank and congratulate NASA and to offer my praise to them for a job well done to the highest standards of excellence so far in their work on NAOMS. There are many data collection systems in place to track air safety problems, and NAOMS is a terrific addition to this array.

In my opinion NAOMS has been a great success, and NASA deserves to be very proud of this success and deserves the thanks of this Congress and of all Americans.

As you know NAOMS was designed to measure the frequency of the precursors of aviation accidents through statistically-reliable scientific surveys of pilots. You might imagine that information on these events can be collected reliably by machines, by black boxes on aircraft, by computers in the air traffic control system, and by video cameras watching airport operations.

But imagine the gigantic volume of information that would be collected by such systems in just one day and imagine trying to wade through that mountain of information to try to identify safety compromising events. And that mountain would not even include the many experiences and events that occur during interactions between people without a machine record.

This is why NAOMS was conceived as it was; to use the eyes and ears of the people actually operating the aviation system to track what they experience and convey the resulting information to policy-makers. For decades the Federal Government has sponsored many longstanding and recurring survey projects to collect information used to promote public welfare. The unemployment rate is measured through surveys, the inflation rate is measured through surveys, and federal agencies regularly conduct surveys to measure much, much more.

Surveys are a mainstay at the Federal Government and have been shown to provide valuable scientific measurements of the experiences of our nation's huge population quickly, accurately, and inexpensively as compared to other ways to learn the same information.

Loren Rosenthal's vision of NAOMS is shown on this slide, which was presented by NASA in many public meetings. The NAOMS Project was to involve the design and implementation of surveys not only of pilots but also of air traffic controllers, flight attendants, and mechanics every week of every year to measure how many of various specific accident precursors they had witnessed while working during the past 60 days.

As you can see from this diagram in the upper right, this was to be a permanent monitoring system. I was privileged to be asked to serve as a consultant to the team of superb professionals who have carried out the work done on NAOMS to date. As I watched the team do its work over a period of years, I saw a great deal about how it was done.

I look forward to answering your questions, but in the remaining opening moments I have I would like to set the record straight on five important misunderstandings that have found their way into the public discussion of NAOMS during the past week.

First, some people have claimed that the NAOMS methodology was not peer reviewed. This is incorrect. The survey methods used in NAOMS have been peer reviewed and widely accepted in the field for more than 40 years. And the NAOMS Team used peer reviewed and well-established evaluation techniques to select the best standard methods for use in the NAOMS surveys.

Furthermore, survey research experts at the White House Office of Management and Budget must review every federal survey project to assure that the methods to be used are optimal, and they reviewed and approved the NAOMS methodology.

And prior to that approval process the NAOMS Team had held dozens of meetings, workshops, and consultations around the country with aviation experts, interested parties, and social scientists to describe the project's methodology and get reviews, comments, and suggestions.

Second, some people have said that NAOMS was not shut down prematurely. This is incorrect. The slide up on the screen shows you that initial NAOMS funding was intended to pay for surveys to be done not only of pilots but of air traffic controllers, flight attendants, and mechanics. But the funding for NAOMS was ended before that work was initiated.

Third, some people have said that the NAOMS Project was designed simply to test the feasibility of a method, not to implement that method in a long-term survey monitoring system. This is incorrect. We determined that the method was viable and effective after a field trial involving 635 pilots. You don't do 24,000 interviews of pilots to test the feasibility of a method. You do that many interviews after you know the method is feasible and ready for prime time.

Fourth, some people have said that if the NAOMS data were released to the public, individual pilots or airlines would be identifiable. This is incorrect. The overwhelming majority of NAOMS data cannot be linked to any pilot or airline because the system was set up to assure that from the start. The very small number of instances in which a pilot mentioned a specific airline or event date spontaneously can easily be removed from the public data set and made available to analysts only through Census Data Centers, which the Federal Government created exactly for the purpose of allowing researchers to use highly-confidential government data for research purposes while protecting anonymity.

Lastly, some people have said NAOMS data cannot be used to compute the rates at which events happened because multiple respondents might have reported the same event, leading to overestimates. This is incorrect. NAOMS was designed intentionally to collect multiple reports of the same event, and NAOMS was also designed to implement a statistical procedure to recognize this multiple reporting when translating the results of the surveys into computation of event counts.

My best guess of why you heard earlier that events are—event rates are too high in the survey is because that correction is not being implemented properly.

Thus, these five criticisms of NAOMS are unfounded, and for these many reasons I believe that NASA deserves terrific praise for initiating NAOMS and for carrying out the work done so far so well. The method offers a new way to complement existing streams of data on aviation safety and it is relatively cheap and quick compared to the other methods being implemented.

So in closing I want to thank NASA for the decision to make existing NAOMS data available to the public, along with complete documentation on exactly how the data were collected, but most importantly I want to urge NASA and this committee to restart NAOMS data collection where they left off. There is much left on the diagram on the screen to be done, and if NASA gets to work doing it, there will almost certainly be terrific benefits for this nation. And this committee can take some credit for those benefits if it comes about.

NASA did a great job with NAOMS already, and they have a unique position of trust, objectivity, and scientific expertise in the aviation world that will allow them to carry out this work with efficiency and credibility. I hope they will chose to continue this important work in the future.

Thank you very much.

[The prepared statement of Dr. Krosnick follows:]

PREPARED STATEMENT OF JON A. KROSNICK

Thank you very much for the invitation to submit this statement and to testify before the Committee as it explores the history of NASA's National Aviation Operations Monitoring Service (NAOMS).

Currently at Stanford, I am the Frederic O. Glover Professor of Humanities and Social Sciences, Professor of Communication, Professor of Political Science, Professor of Psychology (by courtesy), and Associate Director of the Institute for Research in the Social Sciences.

As a member of the team that developed NAOMS, my role was as an expert on survey research methodology and questionnaire design.

My Qualifications and Experience

While I have been a Professor at the Ohio State University and now at Stanford University, a great deal of my research has involved the collection and analysis of survey data, and many of my publications have been designed to identify best practices in survey methodology.

As my curriculum vitae outlines (see Appendix A of this statement), I have published five books and am currently completing the fifth, *The Handbook of Questionnaire Design* (Oxford University Press). I have published 107 journal articles and book chapters in peer-reviewed publications. I have presented 252 papers reporting my research findings at research conferences around the world, where presentations were selected through a peer review process. I have received 65 grants and contracts supporting my research and am currently overseeing active grants and contracts totaling more than $10 million.

I have served as a consultant to the following federal agencies on survey research issues: The Government Accountability Office (GAO), the Internal Revenue Service (IRS), the Central Intelligence Agency (CIA), the National Institutes of Health (NIH), the National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA), the Bureau of the Census, the Bureau of Labor Statistics (BLS), the Centers for Disease Control and Prevention (CDC), and the National Cancer Institute (NCI). I have advised these agencies on how to implement best practices in the survey research they conduct.

I currently serve as co-principal investigator of the American National Election Study (ANES), the academic world's leading survey study of voting and elections, which is supported by a $7.6 million grant from the National Science Foundation. This project began in 1948 with a national survey of a representative sample of American voters, and the same sort of survey has been conducted every two years since then. The data from the ANES are made public at no charge to all interested investigators around the world. As co-principal investigator, my responsibilities include all decisions about methodology for the collection of the survey data and all decisions regarding the design of the questionnaires used.

I also serve on the Board of Overseers of the General Social Survey, which is the Nation's preeminent survey study of trends in Americans' social and political attitudes and behavioral experiences. Since the early 1970s, this study has involved annual or biannual surveys of representative national samples of American adults interviewed in their homes for hours and documenting a wide range of their opinions and experiences. Like the ANES, the GSS has been funded by the National Science Foundation, and the study's data are made available for free to all interested researchers around the world and

The NAOMS Vision

The instigation of NAOMS was a commitment made in the 1990s by the Federal Government to reduce the risk of commercial airplane crashes by a specific targeted amount within ten years. Once that target was set, federal agencies looked for ways to assess whether that goal would be achieved and realized they had none. Simply tracking plane crashes would not be sufficient, because they happen extremely rarely and therefore do not indicate the amount of underlying risk posed by the many small events that, when cumulated, can increase the risk of an accident. Consequently, some alternative monitoring system was needed.

The Federal Aviation Administration, other agencies, and private sector organizations (e.g., commercial airlines) have been collecting some information on the frequency with which some risk-elevating events have been occurring. But the array of event types being tracked was more limited than is needed for thoroughly tracking the functioning of the entire air travel system. Some anecdotal information has also been collected, but this information could not be used to calculate statistically reliable risk levels. Therefore, a new system for collecting information on the frequency of precursors to accidents was needed.

NAOMS was designed to serve this purpose and to collect the needed information via high quality scientific and reliable surveys of people around the world who were watching the operation of the aviation system first-hand and who knew what was happening in the field. Indeed this use of the survey method was in keeping with many other long-term federally funded survey projects that provide valuable information to monitor public risk, identify sources of risk that could be minimized, identify upward or downward trends in specific risk areas, to call attention to successes, identify areas needing improvement, and thereby save lives while promoting commerce in the Nation.

As originally conceived by Battelle Project Manager Loren Rosenthal, NAOMS was to be a multifaceted survey project building on the Aviation Safety Reporting System (ASRS). For many years, ASRS has been a successful system for collecting anecdotal information from pilots about some of the risk-elevating events they witnessed. Each time an event occurs, a pilot can choose to fill out a form describing it briefly and mail the form to NASA's ASRS office in Mountain View, California. An aviation expert then telephones the reporter to conduct a telephone interview to gather detailed information about the event. A subset of this information is then entered anonymously into a database that NASA maintains. And when important insights about risks have been obtained through this system, NASA has sent out reports to the aviation community.

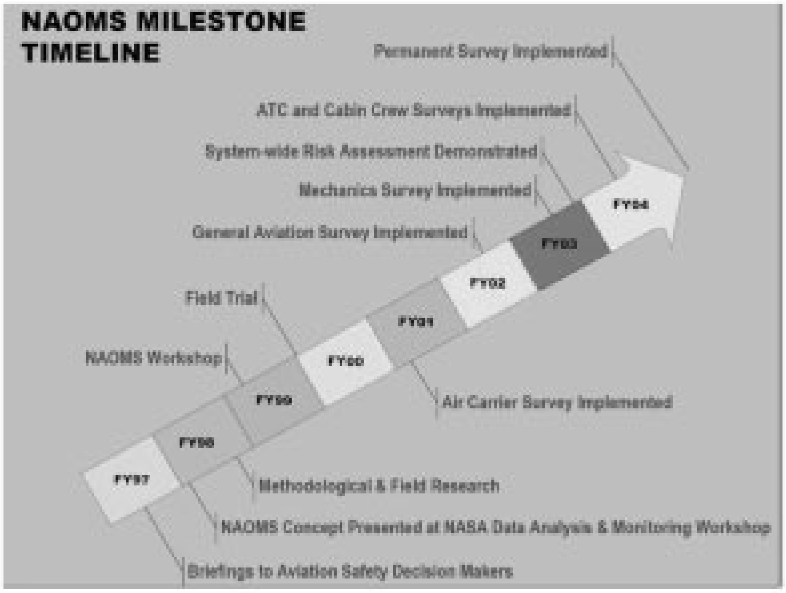
ASRS has successfully collected information that has had observable positive effects enhancing public safety. Pilots have come to trust it and NASA generally (because nothing undesirable has occurred to a pilot as the result of filing an ASRS report), and ASRS has had the flexibility to collect data on whatever events pilots deem worth reporting.

But this flexibility also constitutes a significant limitation of ASRS as well. Because pilots voluntarily choose to file reports on events, their choices about when to report and what to report are uncontrolled. Consequently, many safety-related events go unreported to ASRS. And as a result, it is impossible to use ASRS to track trends in event rates over time. Therefore, NAOMS was envisioned to complement ASRS by producing accurate measurements of rates and trends in rates of a wide array of types of events.

Every week of every year, NAOMS was planned to collect information from a representative sample of pilots flying commercial aircraft. The pilots would be asked to report the number of each of a series of different specific events that they had witnessed during a specific recent time period (e.g., the last 60 days). These counts could then be used to calculate the rates at which the events had occurred during that period throughout the entire air travel system.

NAOMS had the potential to succeed especially because ASRS had already been successful. The trust that the community of commercial pilots had developed in NASA through its running of ASRS meant that these pilots could most likely be counted on to participate in NAOMS surveys at a high rate without concern about retribution. That is, the pilots could be expected to provide accurate and honest reports of event frequencies, because they already knew that NASA (through ASRS) was capable of compiling and reporting such data in a trustworthy and safety-enhancing way.

But NAOMS was envisioned to go well beyond ASRS, by tapping the knowledge and experiences of other professionals participating in the air travel system and observing risk-elevating events. Specifically, the original plan for NAOMS included collecting survey data every week of every year from general aviation pilots, helicopter pilots, air traffic controllers, flight attendants, and mechanics, as shown in the following timeline that was presented by NASA at various public meetings describing the project:


NAOMS MILESTONE TIMELINE
Permanent Survey Implemented
ATC and Cabin Crew Surveys Implemented
System-wide Risk Assessment Demonstrated
Mechanics Survey Implemented
General Aviation Survey Implemented
Field Trial
NAOMS Workshop
FY04
FY03
FY02
FY01
FY00
FY99
FY98
FY97
Air Carrier Survey Implemented
Methodological & Field Research
NAOMS Concept Presented at NASA Data Analysis & Monitoring Workshop
Briefings to Aviation Safety Decision Makers

Thus, the plan was to design and implement a "permanent survey" data collection operation to generate ongoing data to track event rates into the future.

NAOMS Resembled Many Other Federal Surveys

This use of survey methodology in NAOMS was consistent with the conduct of surveys by many organizations in the public and private sectors to track rates of events over time and to inform decision-making and organizational practices. Survey methodology is a highly developed science that can utilize reports of people's experiences to document events occurring around the Nation and around the world quickly and cheaply. In fact, each year, billions of dollars are spent conducting surveys around the world. The U.S. Federal Government is one of the largest producers of such data. For decades, survey data have been routinely collected and used by many federal agencies to track contemporary life in America in a wide array of domains and to provide valuable information for policy-making and policy implementation.

A small subset of the survey research projects that have been funded by the U.S. government continuously, beginning in the years shown and sponsored by the agencies in parentheses, includes:

- Survey of Income and Program Participation (Census Bureau) 1984–
- Consumer Expenditure Surveys (Census Bureau) 1968–
- Annual Housing Surveys (Census Bureau) 1973–
- Survey of Consumer Attitudes and Behavior (National Science Foundation) 1953–
- Health and Nutrition Examination Surveys (National Center for Health Statistics) 1959–
- National Health Interview Surveys (National Center for Health Statistics) 1970–
  American National Election Studies (National Science Foundation) 1948–
- Panel Study of Income Dynamics (National Science Foundation) 1968–
- General Social Survey (National Science Foundation) 1972–
- National Longitudinal Survey (Bureau of Labor Statistics) 1964–
- Behavioral Risk Factor Surveillance System (Centers for Disease Control and Prevention) 1984–
- Monitoring the Future (National Institute of Drug Abuse) 1975–

- Continuing Survey of Food Intake by Individuals (Department of Agriculture) 1985–
- National Aviation Operations Monitoring System (National Aeronautics and Space Administration) 2002–
- National Survey of Drinking and Driving (National Highway Traffic Safety Administration) 1991–
- National Survey of Family Growth (National Center for Health Statistics) 1973–
- National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (Census Bureau) 1991–
- National Survey of Child and Adolescent Well-Being (Department of Health and Human Services) 1997–
- Survey of Earned Doctorates (Science Resources Statistics Program, National Science Foundation) 1958–
- National Survey on Drug Use and Health (Department of Health and Human Services) 1971–
- Youth Risk Behavior Surveillance System (Department of Health and Human Services) 1990–
- National Crime Victimization Survey (Bureau of Justice Statistics) 1973–
- Schools and Staffing Survey (National Center for Educational Statistics) 1987–
- Educational Longitudinal Survey (National Center for Educational Statistics) 2002–
- Current Employment Statistics Survey (Bureau of Labor Statistics) 1939–

Just a few of the many other major surveys sponsored by federal agencies over the years include:

- National Survey of Distracted and Drowsy Driving (National Highway Traffic Safety Administration)
- National Survey of Veterans (Department of Veterans Affairs)
- National Survey of Children's Health (Health Resources and Services Administration's Maternal and Child Health Bureau)
- National Survey of Recent College Graduates (Science Resources Statistics Program, National Science Foundation)
- National Survey of Speeding and Other Unsafe Driving Actions (National Highway Traffic Safety Administration, Department of Transportation)

Survey data form the basis of many important government policy-making decisions. For example, economists in the Federal Reserve and other agencies pay close attention to the federal unemployment and inflation rates, both of which are calculated using data from national surveys. The many other federal agencies listed above collect survey data because those data are used in on-going decision-making.

Decades of research have shown that the reliability and validity of optimally-collected survey data are generally quite high, and that respondents can be relied upon to provide quite accurate descriptions of their past experiences, behaviors, and opinions. Most visibly, surveys conducted just before U.S. presidential elections predict the actual election vote results very closely (see, e.g., Visser, P.S., Krosnick, J.A., Marquette, J., & Curtin, M., 1996; Mail surveys for election forecasting? An evaluation of the Columbus Dispatch poll. *Public Opinion Quarterly,* 60, 181–227, Visser, P.S., Krosnick, J.A., Marquette, J., & Curtin, M., 2000; Improving election forecasting: Allocation of undecided respondents, identification of likely voters, and response order effects. In P. Lavrakas & M. Traugott (Eds.), *Election polls, the news media, and democracy.* New York, NY: Chatham House). Even when there is error in such survey measurements (and there is), the error is not huge in percentage point terms (bearing in mind that a small shift in percentages can change the winner of a close election). For example, since 1936, the percent of votes won by the winner has correlated with the Gallup Poll's pre-election prediction of that percentage .85, a nearly perfect association.[1] Likewise, since 1948, the American National Election Study surveys' post-election measurements of the proportions of votes won by the winning presidential candidate have correlated with official government vote counts .92, again nearly perfect.

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[1] Correlations can range from 1 (meaning a perfect match between the variables) to 0 (meaning a relation between the variables no better than chance) to -1 (meaning a perfect inverse relation between the variables).

Equally striking are the results of the Monthly Survey of Consumer Attitudes and Behavior, conducted continuously by the University of Michigan's Survey Research Center since 1970. Each month, a representative national sample of American adults has been asked what they expect to happen to the unemployment and inflation rates in the future (as well as many other topics), and their aggregated answers have predicted later changes in actual unemployment and inflation remarkably well (correlations of .80 and .90, respectively, between 1970 and 1995). This is testimony not only to the aggregated wisdom of the American public but also to the ability of scientific surveys to measure that wisdom accurately.

A high level of accuracy can be achieved if optimal procedures are implemented to conduct a survey, and departures from such procedures can significantly compromise the accuracy of a survey's findings. Necessary features include drawing a representative sample of the population, taking extensive steps to collect data from as many sampled people as possible, optimizing the choice of survey mode to achieve accurate measurements, asking questions that are easily comprehensible and do not entail biased wording or format, weighting results to correct for unequal sampling probabilities, and much more.

Survey Methods Development in NAOMS

When I was brought onto the research team, I was told that the project was committed not just to designing and conducting surveys, but to doing so with the best possible practices to assure the most accurate data possible. Thus, rather than simply using intuition and budget limitations as guidelines for making methodological decisions, the project set out to design practices that would optimize data accuracy.

To this end, we conducted a series of studies, including a large-scale field trial, to answer a series of questions with regard to the first survey we developed for air carrier pilots:

- What risk-elevating events should we ask the pilots to count?
- How shall we gather the information from pilots—written questionnaires, telephone interviews, or face-to-face interviews?
- How far back in the past can we ask pilots to remember without reducing the accuracy of their recollections?
- In what order should the events be asked about in the questionnaire?

What events? The goal of the NAOMS survey was to collect information on as many different sorts of risk-elevating events as possible. To begin generating a comprehensive list of such events, we conducted a series of focus group discussions with professionals who were active in the air traffic system, including air carrier pilots, general aviation pilots, helicopter pilots, and air traffic controllers. In each of these group discussions, we asked participants to generate as comprehensive a list of risk-inducing events as they could during a two-hour period. These exercises revealed a coherent and repeatedly-occurring list of events that seemed quite suitable for tracking by NAOMS surveys.

In addition, we consulted with industry and government safety groups, including members of CAST, the FAA, and the analysts who conducted telephone interviews of pilots submitting reports to ASRS. We also reviewed the contents of aviation event databases, such as the ASRS, NAIMS, and BTS databases. In the end, we chose to track a set of events that was faithful to those pinpointed by these data-gathering exercises.

What mode? At the time that NAOMS was launched, it was widely recognized in the survey research community that face-to-face interviewing was the optimal way to collect accurate and honest data from respondents. Although most surveys at that time were being conducted by telephone, the Federal Government's most important and visible surveys continued to rely on face-to-face interviewing. When a competent, committed, and professional interviewer meets face-to-face with a respondent, the respondent develops a sense of trust in and rapport with the interviewer, inspiring the respondent to devote the cognitive effort needed to generate accurate responses and the confidence that his/her identity will be protected, so that honest reports can be provided without fear of retribution.

We therefore decided to explore the viability of face-to-face interviewing of pilots for NAOMS. However, we recognized that such interviewing would be costly and logistically challenging, so we also explored the viability of two alternative modes: telephone interviewing and paper-and-pencil questionnaires. At the time we initiated NAOMS, the published survey methodology literature did not offer clear guidance about the quality of data to be expected from these two latter modes. We therefore designed a "field trial" to compare the three modes of data collection.

At the start of the field trial, a sample of licensed pilots was selected to be interviewed face-to-face. But it quickly became clear that because of the ongoing mobility of the pilots, it would be practically impossible to coordinate schedules with them to allow interviewers to meet with them and conduct interviews at anything approaching a reasonable cost. Therefore, face-to-face interviewing was abandoned. Consequently, the field trial focused on comparing telephone interviewing and paper questionnaires mailed to respondents using a method developed by Professor Don Dillman (a long-time consultant to the U.S. Census Bureau) to assure high response rates.

Pilots were randomly assigned to be interviewed in one of these modes, and the survey research group at Battelle's Center for Public Health Research and Evaluation conducted the data collection. The cost per interview was $60 for each mailed questionnaire completed, as compared to $75 for each telephone interview completed. But according to all indicators of data quality, we got what we paid for: the telephone interviews yielded superior data. For example, the response rate for the mail questionnaires was 73 percent, and the response rate for the telephone interviews was 81 percent. Whereas pilots never failed to answer a question during a telephone interview, respondents failed to answer 4.8 percent of the questions on the paper questionnaires. Respondents reported significantly more confidence in the accuracy of their answers during the telephone interviews than of their answers on the paper questionnaires. And a built in accuracy check showed that the telephone responses were 30 percent more accurate than the paper responses. We therefore chose to conduct the survey via telephone interviews.

How far back in the past could pilots remember accurately? Our goal was to collect information on as many events as possible without compromising the accuracy of recollections. The longer the time period that pilots were asked to describe, the more rare events could be detected, with no added cost. But if the recall period addressed in the questionnaire was short, then we would have had to increase the number of pilots interviewed considerably in order to detect rare events. A comprehensive review of the existing scholarly literature did not provide clear guidance on what the optimal recall period would be for NAOMS pilots, so we built into the field trial a manipulation designed to identify this optimal recall period.

Specifically, we randomly assigned some pilots to report on the events they witnessed during the last week and others to report on the last two weeks, the last four weeks, the last two months, the last four months, or the last six months. We found that the most accurate reports were provided for the two-month recall period, so we selected that period for the final questionnaire. During the initial months of NAOMS main study data collection, respondents were randomly assigned to be asked about either the last 30 days, the last 60 days, or the last 90 days. But eventually, all pilots were asked about the last 60 days.

What order of questions? Once we had specified a list of events to be addressed, we had to specific the order in which to ask about these events. If the order is optimized, it can make respondents' reporting process easier and their reports more accurate. And if order is not optimized, it can increase the difficulty of the task for the respondents, decrease their enjoyment of it, thereby decrease their motivation to provide accurate reports, and in the end, reduce the accuracy of the reports they do provide.

Optimizing question order begins with the recognition that more complete and accurate recollection occurs when question order matches the way that information is organized in people's long-term memories. That is, psychologists believe that clusters of related pieces of information are stored together in memory. Asking a person to go to a specific location in memory and retrieve all the needed information there before moving on to retrieving information from a different location is preferable to asking people to jump around from place to place in memory, question by question (e.g., Barsalou, 1988; DeNisi & Peters, 1996; Raaijmakers, & Shiffrin, 1981; Sudman, Bradburn, & Schwarz, 1996; Tulving, 1972).

According to this logic, memories of similar safety-compromising events are likely to be stored together in clusters in pilots' memories. So once a pilot begins retrieving memories from a particular cluster, it is easiest and most efficient to recall all other memories in that cluster, rather than jumping to another cluster. Therefore, our questionnaire grouped together questions asking about events that were stored near one another in pilots' memories.

Identifying each respondent's memory organization scheme at the start of each interview is not practical. However, it was possible to assess the most common type or types of mental organizations used by pilots and tailor our questionnaire design to those types. We conducted a series of studies using a series of methods drawn from cognitive psychology to identify pilots' memory organizations, and the results of these studies clearly pointed to a memory organization that applied well across pilots and that we showed could be used to enhance the accuracy of recollections. In fact, our testing indicated that using the memory organization we identified to order questions enhanced recall accuracy by 25 percent or more over other orders we tested.

Questionnaire pretesting. Once a survey questionnaire is designed, it is important to pretest it in various ways to assure that respondents understand the questions and can answer them. To test understandability and answerability, we conducted a series of tests. One test was built into the field trial, whereby we asked respondents to comment on and evaluate the understandability of the questions and to identify any questions that were not sufficiently clear and understandable. We also conducted cognitive think-aloud pretest interviews using a technique pioneered by researchers at the National Center for Health Statistics. This involved having pilots listen to the questions, restate them in their own words, and think aloud while answering the questions. These pretests were used to identify instances in which question wording needed improvement.

Field trial results. The field trial involved collecting data from about 600 pilots, and this allowed us to evaluate the performance of the methodology fully. The results produced by the field trial documented that the methodology worked well. We achieved a very high response rate, and tests indicated high validity of the data. Thus, at the conclusion of the field trial, we had evidence sufficient to conclude that the method was well-designed and suitable for generating reliable data.

Peer reviewing. Questions have been raised recently about whether the NAOMS methodology was subjected to a peer review process. In fact, peer review did occur. The research plan for NAOMS was presented at many public meetings and private meetings with stakeholder organizations and with experts involved in aviation and social science researchers. In all of these meetings, details of the rational for NAOMS and its methodology were described. The attendees asked questions, made comments, and offered suggestions. In addition, multiple meetings were held with large groups of NASA staff and FAA staff to provide details on the NAOMS plan and accomplishments and to acquire feedback.

As far as I understand, NASA did not request or suggest to the NAOMS project team that any additional peer review occur. If such a request had been made, we would have been happy to implement additional review processes. However, that lack of such a request was not surprising to me or unusual in the context of federal survey design and data collection. I have been involved in many federal survey projects, and I have advised federal agencies on many others. The vast majority of these projects involved less peer review than NAOMS carried out. In fact, the only federally funded survey studies I know of that have routinely involved elaborately structure peer review processes are ones that were conducted by the government for use in litigation. These peer review processes rarely yielded significant changes in the survey process. I therefore do not believe that any additional peer review of the NAOMS methodology would have been significantly beneficial or caused any significant changes in procedure.

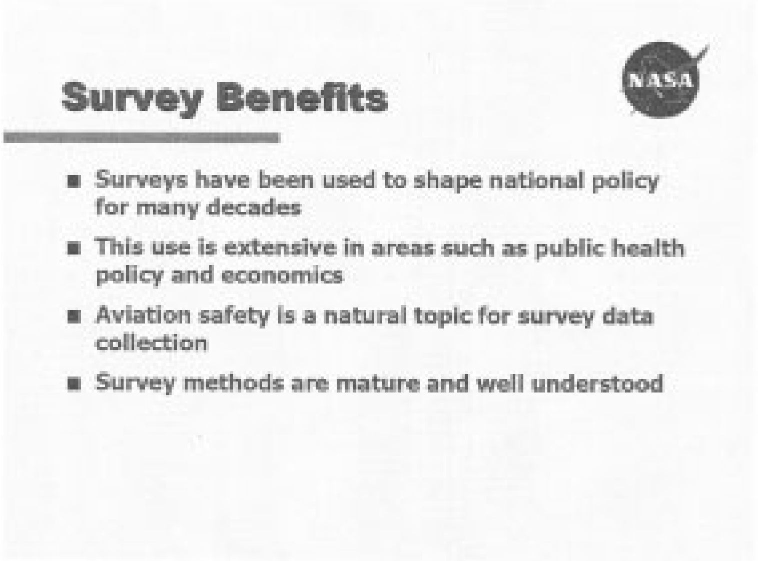
An important reason for this is that in my role as a professor, I am responsible for keeping fully informed about the state of the survey methodology literature and new developments in survey techniques. By reading printed and online publications and attending conferences to hear presentations, I stay abreast of the field's understanding of best practices. Consequently, I was called upon regularly to evaluate our methodology vis-à-vis common practices in the field of survey research and the views of my professional peers on design issues. Thus, the views of my peers were regularly a focus during our planning process.

Summary. The methods we used to develop the NAOMS questionnaire were state of the art. Indeed, the preliminary studies we conducted constitute valuable contributions to the scholarly literature on optimal survey design, producing findings pointing to best practices and identifying new methods for future tests intended to optimize survey designs. Thus, NASA can be very proud of what it accomplished during this phase of the project.

My View of NAOMS

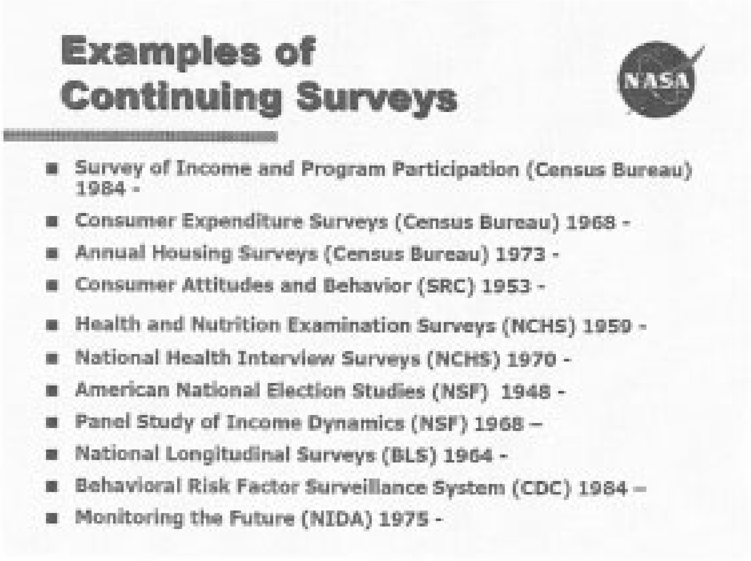
It was a privilege and an honor for me to have been asked to serve as a methodology expert on the NAOMS project. And it was a pleasure to work with the research team that carried out the project. Robert Dodd (now of the NTSB), Loren Rosenthal and Joan Cwi (of Battelle Memorial Institute), and Mary Conners and Linda Connell (of NASA) were consummate professionals who worked wonderfully together, even through times of tough decision-making. And the work done by the team was of superb quality.

Because NAOMS was so well conceived, I looked forward to continuation of the project and the development of a large publicly available database for the study of air travel safety. In our public meetings with interested parties, we presented the following slides to illustrate the widespread use of surveys by federal agencies and the common practices for running these surveys over long time periods and distributing the data.



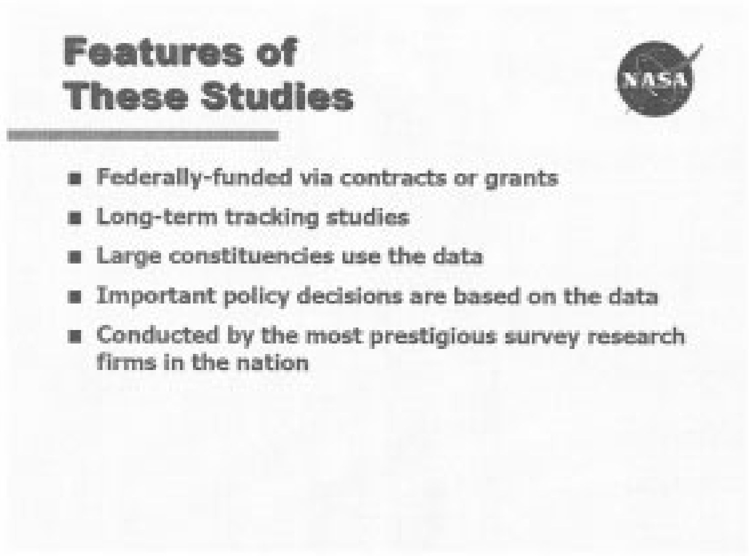
Survey Benefits

- Surveys have been used to shape national policy for many decades
- This use is extensive in areas such as public health policy and economics
- Aviation safety is a natural topic for survey data collection
- Survey methods are mature and well understood



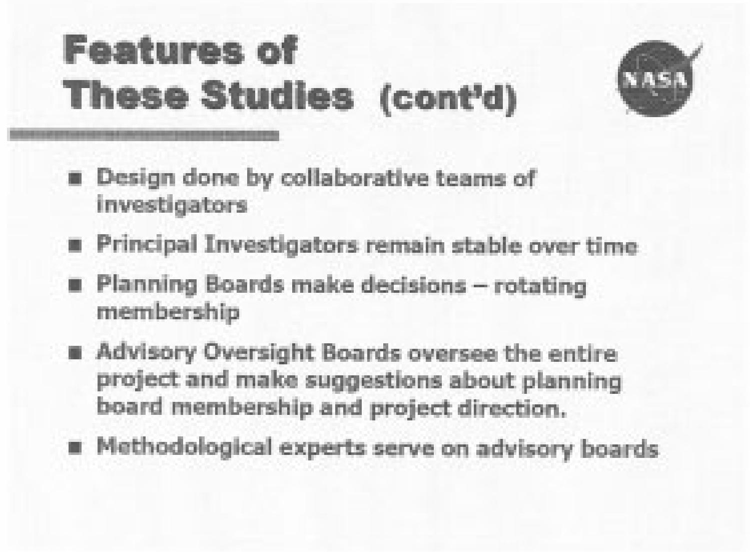
Examples of Continuing Surveys

- Survey of Income and Program Participation (Census Bureau) 1984 -
- Consumer Expenditure Surveys (Census Bureau) 1968 -
- Annual Housing Surveys (Census Bureau) 1973 -
- Consumer Attitudes and Behavior (SRC) 1953 -
- Health and Nutrition Examination Surveys (NCHS) 1959 -
- National Health Interview Surveys (NCHS) 1970 -
- American National Election Studies (NSF) 1948 -
- Panel Study of Income Dynamics (NSF) 1968 –
- National Longitudinal Surveys (BLS) 1964 -
- Behavioral Risk Factor Surveillance System (CDC) 1984 –
- Monitoring the Future (NIDA) 1975 -



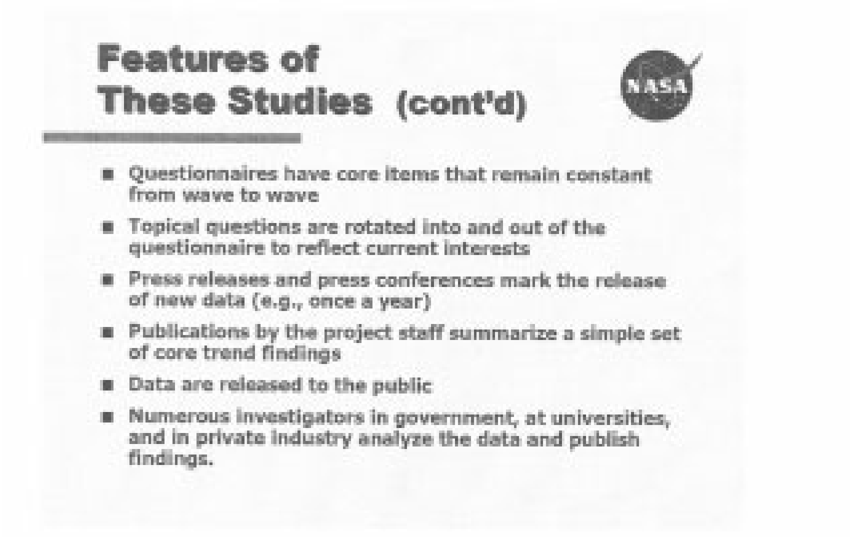
Features of These Studies

- Federally-funded via contracts or grants
- Long-term tracking studies
- Large constituencies use the data
- Important policy decisions are based on the data
- Conducted by the most prestigious survey research firms in the nation



Features of These Studies (cont'd)

- Design done by collaborative teams of investigators
- Principal Investigators remain stable over time
- Planning Boards make decisions – rotating membership
- Advisory Oversight Boards oversee the entire project and make suggestions about planning board membership and project direction.
- Methodological experts serve on advisory boards



Features of These Studies (cont'd)

- Questionnaires have core items that remain constant from wave to wave
- Topical questions are rotated into and out of the questionnaire to reflect current interests
- Press releases and press conferences mark the release of new data (e.g., once a year)
- Publications by the project staff summarize a simple set of core trend findings
- Data are released to the public
- Numerous investigators in government, at universities, and in private industry analyze the data and publish findings.

Thus, we intended to set up such a long-term data collection and dissemination system for NAOMS.

When I heard that interviewing of air carrier pilots had been terminated and then that all funding for NAOMS had been stopped, I was surprised. As far as I knew, the project had been conducted according to best practices, and nothing that happened during that period suggested anything to the contrary.

In my view, NAOMS was intelligently conceived and excellently implemented. Thus, for as far as it went, NAOMS deserves a great deal of praise from NASA and from all Americans. Indeed, NASA and the Federal Government should be very proud of what it accomplished with NAOMS, because its success is just what all government agencies hope for when setting out to do good for this nation.

My belief in the value of NAOMS for this country led me to write an op-ed essay published in the *New York Times* in 2006 just after I got the news of discontinued funding. I wrote that essay with the goal of calling attention to the great success of NAOMS and perhaps to lead to a reconsideration of its termination.

At the very least, I hoped that a way could be devised to allow researchers to have access to the data that were collected via approximately 24,000 interviews with air carrier pilots over a period of years.

These data can be useful in a number of ways. First, they can document the frequency with which various types of events were occurring. According to our interviews with pilots early on in the project, they thought that NAOMS would be valuable partly because it would call attention to surprisingly high frequencies of some low-risk events that could be easily reduced or eliminated.

Second, the NAOMS data can be compared to data on the frequency of similar events collected by other data sources. For example, ASRS and the FAA collect data that can be used to compute event rates and compared directly to some of the events asked about in the NAOMS questionnaire. If the NAOMS questionnaires yield different rates than these other reporting systems, that would highlight potential opportunities to explore the sources of those discrepancies, which might yield improvements in measurement methods and a clearer understanding of what measurement procedures are most accurate.

Third, the NAOMS data can be used to compute trends over time in event rates. This was of course the primary intended purpose of NAOMS when it was originally envisioned. Thus, NAOMS could be used to gauge whether changes in the air travel system during the years of data collection were successful in reducing risk. Because NAOMS data were collected both before and after September 11, 2001, it would be possible to see how the changes in practices that occurred at that time translated into changes in event frequencies.

Fourth, the NAOMS questionnaires are designed in ways that allow analysts to assess some of the conditions under which particular types of events are most likely to occur. For example, it is possible to explore whether some types of events occurred more on aircraft flown by pilots with less total career flying experience or by pilots with more than a certain amount of experience. It is possible to explore whether some types of events occurred more on some types of aircraft than on others. Such findings could be used to inspire further research to identify the reasons for the observed relations and then perhaps to change aviation practices to enhance safety.

Fifth, the NAOMS data would allow researchers to conduct studies for optimizing survey methods generally. Not only is this possible by publishing reports of the field trial and preliminary studies done to prepare the NAOMS questionnaire and methodology, but the main study data can be used for this purpose in multiple ways. For example, it would be possible to compare the findings of data collected from pilots asked about events they witnessed during the last 30, 60, or 90 days to see how length of the recall period affected the accuracy of their recollections. This would be useful information to inform survey designers generally interested in optimizing recall questions. Also, it would be possible to explore how survey non-response is related to survey results, addressing a particularly hot topic in the survey methodology literature at the moment.

For all of these reasons, I believe that the existing NAOMS data should be made publicly available right away so that analysts can learn everything that can be learned from the data, to make the most of the $8.4 million that NASA spent on the project. I believe that the model for making these data public should be the ASRS. NASA has been very successful in setting up a system for fully publicly disseminating the terrifically valuable information provided by pilots through the ASRS reporting system, and a comparable dissemination system can be created for NAOMS data as well.

Documenting the NAOMS Data in Detail

In order to allow the dissemination of these data to yield the most positive benefits, it is essential that NASA provide extensive and detailed documentation of the procedures by which the study was designed and the procedures by which the main data were collected. This includes descriptions of sampling, of respondent recruiting, of locating potential respondents, of training interviewers, of releasing cases for interviewing at particular times, and more. The full array of electronic files documenting all phases of the data collection should be made public while protecting the identities of the individuals who were interviewed.

In addition, NASA should help analysts use the data by providing written guidelines on how to properly analyze the data in light of the study design. No one knows the design complexities better than the NAOMS research staff. So they should write documentation to help analysts understand the origins of and potential uses of the data set.

Just one illustration of how complex analysis of these data is involves the issue of multiple reporting of the same event. One potential use of NAOMS data is to calculate the rates at which particular risk-increasing events happened during particular time periods. NAOMS was designed to yield such estimates, but calculation of them must be done carefully.

Consider, for example, bird strikes. An analyst might be tempted to simply count up the number of times that pilots who were interviewed during a particular time period (e.g., calendar year 2003) reported experiencing a bird strike. Then, the analyst might be tempted to multiply this total by the ratio of the total number of licensed pilots during that time period divided by the number of pilots who completed interviews in the survey to yield a projected total number of bird strikes that occurred to the entire population of pilots.

However, multiple pilots witnessed each bird strike, and each bird strike could have been reported by each of those pilots. Specifically, a collision of a bird with an airplane would have been witnessed by two pilots on aircraft with two cockpit crew members and by three pilots on aircraft with three cockpit crew members. Thus, each bird strike had twice the probability of being reported by two-crew aircraft pilots and three times the probability of being reported by three-crew aircraft pilots. So in order to calculate the number of events accurately, the observed total number of events must be adjusted downward to account for this multiple reporting.

NAOMS was designed knowing that this sort of calculation must be carried out. The questionnaire collected information necessary to implement corrections for this multiple reporting. Providing information to analysts about how to do this computation would be a valuable public service. With substantial documentation accompanying the data, analysts can be sure to calculate statistics properly by taking into account all such analytic considerations.

In addition to providing this documentation immediately, I would strongly recommend to NASA that they assemble and fund a “swat” team of suitable experts to conduct all possible analyses with the NAOMS data and issue an initial report of their findings as quickly as possible. Subsequent reports can then be issued later as additional analyses are conducted.

I assume that this "swat team's" effort should build on the work that NASA has done already in constructing a final report on the data, which they planned to release later this year. I have not seen a draft of that report and don't know anything about its contents. But if it is not completely comprehensive in addressing all issues that the data can address and completely comprehensive in fully documenting all procedural details of how the data were collected, I would recommend that its scope be expanded accordingly, with proper government funding to permit it to be done as well as all of the rest of NAOMS to date.

The Future of NAOMS

One might imagine that the book has been closed on NAOMS and that clean-up activity is all that remains on this project. But I believe that to think of NAOMS in these terms would forego a wonderful opportunity for NASA and for this government and for this country.

NAOMS data are not being generated by any other source. And from all indications, the NAOMS data that were collected are reliable and valid. Furthermore, our team's public meetings with stakeholders indicated considerable enthusiasm for the sorts of data that NAOMS was intended to provide.

Therefore, I believe, the vision of a multi-faceted NAOMS data collection monitoring service was and is terrifically positive for everyone who flies on planes, everyone who works in the commercial aviation system, everyone who manufactures airplanes, and everyone who monitors and helps to optimize aeronautics in American.

Consequently, I recommend **restarting NAOMS data collection** where it left off and bring its potential fully into being. Doing so would be a great service of this government to this country.

There has been some discussion recently of the notion that NASA has prepared NAOMS to be handed off to another organization to continue the data collection in the future. Two organizations that have been mentioned in this regard are the Air Line Pilots Association (ALPA) and the Commercial Aviation Safety Team (CAST).

I believe that such a hand-off would be unwise, untenable, and unlikely to lead to successful continuation of NAOMS data collection. The reason is that within the aviation safety community, NASA is uniquely qualified to carry out this work in an optimal form, for a series of reasons.

First, NASA has built up a unique credibility and trust in the aviation safety community by running ASRS successfully over the years. No other agency has the trust of all interested parties inside and outside of government the way NASA does. This trust will enhance the likelihood that pilots, air traffic controllers, flight attendants, and mechanics will agree to participate in survey interviews. NASA's reputation for scientific excellence is especially important to allow NAOMS data to earn the trust that they deserve.

Second, NASA has the scientific credibility and third-party objectivity to be able to collect data at a distance from those who run airlines, manufacture aircraft, and fly on those aircraft. If the data collection were to be run by any interested party, their values might be perceived, rightly or wrongly, to have influenced the results they obtain and/or distribute. This is a context in which government oversight and management of an information collection system run by a private sector contractor with considerable expertise is the best way to allow that system to be most effective and most helpful to all who can benefit from it.

Most importantly, I have not heard of any commitment made by ALPA, CAST, or any other private sector organization to commit funds to initiate and maintain continued NAOMS data collection using the same high-quality methodology that NASA developed. The benefits of ASRS data are obvious to all who use that growing data set of anecdotes. Considerable added value can and should be created by making long-term commitment through appropriate funding to allow NASA to restart NAOMS data collection from pilots, air traffic controllers, flight attendants, and mechanics.

The Members of this committee fly on commercial airlines, as do huge numbers of your constituents, including me. I believe that we all deserve to fly on the safest possible system. NASA's efforts in building and carrying out NAOMS offer the opportunity to significantly enhance our safety by watching carefully what happens in real time and documenting risk-elevating events in ways that enable minimization of them. As the aviation system grows and changes in the coming years, keeping a close eye on its functioning can only increase public confidence in air travel. I therefore urge this committee to please take this opportunity to do what I believe your constituents would want: to reactive this valuable system under NASA's roof.

Conclusion

The U.S. Federal Government in general and NASA in particular have a great deal to be proud of regarding NAOMS. NAOMS was intended to fill a hole by creating an ongoing pipeline of valuable information for the public and for the private sector to enhance the welfare of all Americans. It has succeeded in doing so and can continue to do so in the future. Thank you for taking this opportunity to consider assuring that to happen.

BIOGRAPHY FOR JON A. KROSNICK

Education

A.B., Harvard University (in Psychology, Magna Cum Laude), 1980.

M.A., University of Michigan (in Social Psychology, with Honors), 1983.

Ph.D., University of Michigan (in Social Psychology), 1986.

Employment

2006– , Research Professor, Survey Research Laboratory, University of Illinois.

2005– , Senior Fellow, Institute for the Environment, Stanford University.

2004– , Frederic O. Glover Professor in Humanities and Social Sciences, Stanford University.

2004– , Professor, Department of Communication, Stanford University.

2004– , Professor, Department of Political Science, Stanford University.

2004– , Professor, Department of Psychology (by courtesy), Stanford University.

2004– , Associate Director, Institute for Research in the Social Sciences, Stanford University.

2004– , Director, Methods of Analysis Program in the Social Sciences, Stanford University.

2004–2006, Visiting Professor, Department of Psychology, The Ohio State University.

2003–2004, Visiting Professor, Department of Communication, Stanford University.

1986–2004, Assistant to Associate to Full Professor, Departments of Psychology and Political Science, The Ohio State University.

1987–1989, Adjunct Research Investigator, Survey Research Center, Institute for Social Research, University of Michigan.

1987–1989, Lecturer, Survey Research Center Summer Program in Survey Research Techniques, University of Michigan.

1986–1987, Visiting Scholar, Survey Research Center, Institute for Social Research, University of Michigan.

1985, Lecturer, Department of Psychology, The Ohio State University.

1982–1985, Research Assistant, Center for Political Studies and Survey Research Center, Institute for Social Research, University of Michigan.

1980–1981, Senior Research Assistant, Department of Psychology, Harvard University.

1979–1981, Senior Research Assistant, Department of Behavioral Sciences, School of Public Health, Harvard University.

Honors

1976, Bausch and Lomb Science Award.

1982, National Institute of Mental Health Graduate Training Fellowship.

1984, Phillip Brickman Memorial Prize for Research in Social Psychology.

1984, American Association for Public Opinion Research Student Paper Award.

1984, National Institute of Mental Health Graduate Training Fellowship.

1984, Pi Sigma Alpha Award for the Best Paper Presented at the 1983 Midwest Political Science Association Annual Meeting.

1984, Elected Departmental Associate, Department of Psychology, University of Michigan, recognizing outstanding academic achievement.

1990, Invited Guest Editor, Social Cognition (Special issue on political psychology, Vol. 8, #1, May)

1993, Brittingham Visiting Scholar, University of Wisconsin.

1995, Erik H. Erikson Early Career Award for Excellence and Creativity in the Field of Political Psychology, International Society of Political Psychology.

1996–1997, Fellow, Center for Advanced Study in the Behavioral Sciences, Stanford, California.

1998, Elected Fellow, American Psychological Association.

1998, Elected Fellow, Society for Personality and Social Psychology.

1998, Elected Fellow, American Psychological Society.

2001–2007, Appointed University Fellow, Resources for the Future, Washington, DC.

2003, Prize for the Best Paper Presented at the 2002 Annual Meeting of the American Political Science Association, Section on Elections, Public Opinion, and Voting Behavior.

Selected Invited Addresses

2003, Invited Address, Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

2004, Invited Address, Distinguished Lecture Series Sponsored by the Departments of Psychology and Political Science, University of California, Davis, California.

2004, Keynote Lecture, International Symposium in Honour of Paul Lazarsfeld, Katholieke Universiteit Leuven (Belgium).

2005, Invited Address, Joint Program in Survey Methodology Distinguished Lecture Series, University of Maryland, College Park, Maryland.

2005, Invited Address, “Climate Change: Science → Action,” Conference Hosted by the Yale School of Forestry and Environmental Studies, Aspen, Colorado.

2005, Invited Commentator, “Science for Valuation of EPA’s Ecological Protection Decisions and Programs,” a U.S. Environmental Protection Agency Science Advisory Board Workshop, Washington, DC.

2006, Invited Address, “The Wonderful Willem Saris and his Contributions to the Social Sciences.” Farewell Symposium for Willem Saris, University of Amsterdam, Amsterdam, the Netherlands.

2006, Invited Workshop, “The State of Survey Research.” Annual Summer Meeting of the Society for Political Methodology, Davis, California.

2006, Invited Keynote Address, “Recent Lessons Learned About Maximizing Survey Measurement Accuracy in America: One Surprise After Another.” 2006 Survey Research Methodology Conference, Center for Survey Research, Academia Sinica, Taipei, Taiwan.

2006, Invited Address, “Review of Nonresponse Analysis Across Multiple Surveys.” Conference on “Sample Representativeness: Implications for Administering and Testing Stated Preference Surveys,” Resources for the Future, Washington, D.C.

2006, Invited Address, “Introduction to Survey Issues in Ecological Valuation.” Meeting of the U.S. Environmental Protection Agency Scientific Advisory Board Committee on Valuing the Protection of Ecological Systems and Services (CVPESS), Washington, D.C.

2006, Invited Address, “Gas Pumps and Voting Booths: Energy and Environment in the Midterm Elections.” First Wednesday Seminar, Resources for the Future, Washington, D.C.

2006, Invited Address, “What Americans Believe and Don’t Believe about Global Warming: Attitude Formation and Change in Response to a Raging Scientific Controversy.” National Science Foundation Speaker Series, Washington, D.C.

2006, Invited Address, “Moving Survey Data Collection to the Internet? Surprising Ways that Mode, Sample Design and Response Rates Affect Survey Accuracy.” New York Chapter of the American Association for Public Opinion Research, Fordham University, New York, New York.

2006, Invited Address, “Climate change: What Americans Really Think.” Conference entitled “A Favorable Climate for Climate Action,” sponsored by the Sustainable Silicon Valley, Santa Clara University, Santa Clara, California.

2006, Invited Lecture, “What Americans Really Think About Climate Change: Attitude Formation and Change in Response to a Raging Scientific Controversy.” Brown Bag Series, National Oceanic and Atmospheric Administration, Silver Spring, Maryland.

2007, Invited Lecture, “What Americans Really Think About Climate Change: Attitude Formation and Change in Response to a Raging Scientific Controversy.”

Education And Outreach Colloquium, Earth Sciences Division, NASA Goddard Space Flight Center, Greenbelt, Maryland.

2007, Inaugural Lecture, "The Brave New World of Survey Research: One Surprise After Another." Survey Research Institute First Annual Speaker Series, Cornell University, Ithaca, New York.

2007, Inaugural Lecture, "What Americans Really Think About Climate Change: Attitude Formation and Change in Response to a Raging Scientific Controversy." National Centers for Coastal Ocean Science/Center for Sponsored Coastal Ocean Research Ecosystem Science Seminar Series & NOS Science Seminar Series, National Oceanic and Atmospheric Administration, Silver Spring, Maryland.

2007, Plenary Speaker, "What Americans Really Think About Climate Change: Attitude Formation and Change in Response to a Raging Scientific Controversy." Annual Ocean and Coastal Program Managers' Meeting, Sponsored by the Office of Ocean and Coastal Resource Management in partnership with the National Estuarine Research Reserve Association, National Oceanic and Atmospheric Administration, Washington, DC.

2007, Oral Testimony on Assembly Bill 372 (to revise the order in which the names of candidates for an office must appear on the ballot) before the Nevada State Legislature, Carson City, Nevada.

2007, Invited Lecture, "What Americans Really Think About Climate Change: Attitude Formation and Change in Response to a Raging Scientific Controversy." The White House Office of Science and Technology Policy, Washington, D.C.

2007, Invited Lecture, "What Americans Really Think About Climate Change: Attitude Formation and Change in Response to a Raging Scientific Controversy." Workshop on Climate Science and Services: Coastal Applications for Decision Making through Sea Grant Extension and Outreach. NOAA Coastal Services Center, Charleston, South Carolina.

2007, Invited Lecture, "Climate Change: What Americans Think." Capital Hill Briefing Sponsored by the Environment and Energy Study Institute, Cannon House Office Building, Washington, D.C. Broadcast live in C–SPAN.

2007, Invited Lecture, "The Impact of Candidate Name Order on Election Outcomes." The Carter Center, Atlanta, Georgia.

2007, Invited Lecture, "What Americans Really Think About Climate Change: Attitude Formation and Change in Response to a Raging Scientific Controversy." Google, Mountain View, California.

2007, Invited Lecture, "Climate Change: What Americans Really Think." The Commonwealth Club, San Francisco, California.

2007, Invited Address, "Representativeness of Online Panels." Time-Warner 2007 Research Conference, New York, New York.

2007, Invited Lecture, "What the Public Knows." News Executives Roundtable: Covering Climate Change, Stanford, California.

2007, Invited Address, "The Top Ten Signs of an Excellent Survey Vendor." Intuit Corporatate Customer & Market Insight Offsite, Palo Alto, California.

2007, Invited Lecture, "What Americans Really Think About Climate Change." Association of Science–Technology Centers Conference, Los Angeles, California.

Editorial Board Member

1989–2000, *Journal of Personality and Social Psychology*
2006– ,

1990–1994, *Journal of Experimental Social Psychology*

1997–2003, *Basic and Applied Social Psychology*

1988–1991, *Public Opinion Quarterly*
1994–2002,

1998–2005, *Media Psychology*

2006– , *Sociological Methodology*

External Grants and Contracts

1977, CBS Research Grant, to support development and evaluation of a mass media promotional campaign for sound recordings.

1984, Society for the Psychological Study of Social Issues Doctoral Dissertation Grant-in-aid.

1984, CBS Research Grant, to support literature review/research on the causes of heavy television viewing among children and adolescents.

1985, CBS Research Grant, to support empirical research on the effect of television viewing on alcohol use among children and adolescents.

1985, CBS Research Grant, to support empirical research on the causes of heavy television viewing among children and adolescents.

1987–1989, National Institute on Aging Research Grant, to study changes in political orientations over the life span (with Duane F. Alwin).

1987, National Association of Broadcasters Research Grant, to study the causes of heavy television viewing among children and adolescents.

1988, Society for the Psychological Study of Social Issues Grant-in-Aid, to support research on the causes of heavy television viewing among children and adolescents.

1990–1992, National Science Foundation, The information processing consequences of attitude importance.

1991, National Science Foundation Research Experience for Undergraduates Grant Supplement, The information processing consequences of attitude importance.

1992, Society for the Psychological Study of Social Issues Grant-in-Aid, to support research on the impact of the Gulf War on the constituents of presidential evaluations.

1992, National Science Foundation Research Experience for Undergraduates Grant Supplement, The information processing consequences of attitude importance.

1994, National Science Foundation, Explaining the surprising accuracy of mail surveys.

1995, National Science Foundation Research Experience for Undergraduates Grant Supplement, Explaining the surprising accuracy of mail surveys.

1995, U.S. Department of the Interior/Minerals Management Service/University of California Coastal Marine Institute, Testing and calibrating the measurement of nonmarket values for oil spills via the contingent valuation method (with Michael Hanemann).

1995, Electric Power Research Institute/Industrial Economics, Elicitation of public perceptions regarding the potential ecological effects of climate change (part I).

1996, Electric Power Research Institute/Industrial Economics, Elicitation of public perceptions regarding the potential ecological effects of climate change (part II).

1997, National Science Foundation, Formation and change of public beliefs about global warming.

1997, National Oceanic and Atmospheric Administration/U.S. Environmental Protection Agency/Resources for the Future, Formation and change of public beliefs about global warming: Wave II of survey interviewing.

1998, 1999, 2000, 2001, Robert Dodd and Associates/The Battelle Memorial Institute/National Aeronautics and Space Administration, National Aviation Operations Monitoring System questionnaire development.

2000, 2001, Resources for the Future, American public opinion on the environment.

2001, 2002, Columbus Airport Authority, The dynamics and causes of airport customer satisfaction.

2002, Time-sharing Experiments for the Social Sciences (TESS) grant (funded by the National Science Foundation), Social desirability and reports of voter turnout (with Allyson L. Holbrook).

2003, National Science Foundation, Social and psychological mechanisms of the relation between age and openness to attitude change (with Penny Visser).

2003, New York Academy of Medicine/W. K. Kellogg Foundation, Engaging the community in terrorism preparedness planning.

2003, Decade of Behavior 2000–2010 Distinguished Lecture Program Grant to feature Richard E. Petty at the 2003 annual meeting of the American Association for Public Opinion Research.

2004, National Science Foundation, Optimizing the number of points on rating scales.

2004, The Bureau of Labor Statistics, U.S Department of Labor, Refining the categorization of jobs in the biotechnology industry.

2005, National Science Foundation, 2005 Summer Institute in Political Psychology.

2005, National Science Foundation, Survey Research Methodology Optimization for the Science Resource Statistics Program.

2005, National Science Foundation, American National Election Studies 2005-2010 (with Arthur Lupia).

2006, American Psychological Association, The psychology of voting and election campaigns: A proposal for a stand-alone conference (with Wendy Wood, Arthur, Lupia, and John Aldrich).

2006, National Science Foundation, Agenda-setting workshop in the area of e-science: Development of the next generation of cybertools applied to data collections in the social and behavioral sciences (with Arthur Lupia).

2006, National Science Foundation, Development of a computer network for experimental and non-experimental data collection via the Internet from a nationally representative sample of American households.

2006, National Science Foundation and the Department of Homeland Security, Expansion of the American National Election Study: Gauging the public's Attitudes on terrorism and homeland security (with Arthur Lupia).

2007, National Science Foundation, 2007 Summer Institute in Political Psychology.

2007, National Science Foundation, Survey Research Methodology Optimization for the Science Resource Statistics Program.

2007, National Science Foundation, Survey Research Methodology Optimization for the Science Resource Statistics Program (Supplement).

2007, National Science Foundation, Research Experience for Undergraduates Supplement for the American National Election Study.

2007, National Science Foundation, The Impact of Polls on Political Behavior.

2007, National Science Foundation, American National Election Studies Supplement to Support Additional Pretesting of Questionnaire Items.

2007, National Science Foundation, American National Election Studies Supplement to Support a Conference on Methodology for Coding Open-ended Question Responses.

Books

Weisberg, H., Krosnick, J.A., & Bowen, B. (1989). *Introduction to survey research and data analysis.* Chicago: Scott, Foresman.

Krosnick, J.A. (Ed.). (1990). *Thinking about politics: Comparisons of experts and novices.* New York: Guilford Press (Book version of a special issue of *Social Cognition,* Volume 8, Number 1, 1990).

Petty, R.E., & Krosnick, J.A. (Eds.). (1995). *Attitude strength: Antecedents and consequences.* Hillsdale, NJ: Erlbaum.

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Carson, R.T., Conaway, M.B., Hanemann, W.M., Krosnick, J.A., Mitchell, R.C., Presser, S. (2004). *Valuing oil spill prevention: A case study of California's central coast.* Dordrecht, The Netherlands: Kluwer Academic Publishers.

Krosnick, J.A., & Fabrigar, L.R. (forthcoming). *The handbook of questionnaire design.* New York: Oxford University Press.

Journal Articles and Book Chapters

Krosnick, J.A. (1978). One approach to the analysis of drumset playing. *Percussive Notes,* Spring-Summer, 143–149.

Judd, C.M., Krosnick, J.A., & Milburn, M.A. (1981). Political involvement and attitude structure in the general public. *American Sociological Review,* 46, 660–669.

Krosnick, J.A., & Judd, C.M. (1982). Transitions in social influence at adolescence: Who induces cigarette smoking? *Developmental Psychology,* 18, 359–368.

Judd, C.M., & Krosnick, J.A. (1982). Attitude centrality, organization, and measurement. *Journal of Personality and Social Psychology,* 42, 436–447.

Krosnick, J.A. (1982). Teaching percussion: Growing with your students. *National Association of College Wind and Percussion Instructors Journal,* Summer, 4–7.

Judd, C.M., Kenny, D.A., & Krosnick, J.A. (1983). Judging the positions of political candidates: Models of assimilation and contrast. *Journal of Personality and Social Psychology,* 44, 952–963.

McAlister, A.L., Krosnick, J.A., & Milburn, M.A. (1984). Causes of adolescent cigarette smoking: Tests of a structural equation model. *Social Psychology Quarterly,* 47, 24–36.

Iyengar, S., Kinder, D.R., Peters, M.D., & Krosnick, J.A. (1984). The evening news and presidential evaluations. *Journal of Personality and Social Psychology,* 46, 778–787.

Reprinted in Peplau, L.A., Sears, D.O., Taylor, S.E., & Freedman, J.L. (Eds.) (1988), *Readings in social psychology: Classic and contemporary contributions.* Englewood Cliffs, NJ: Prentice Hall.

Alwin, D.F., & Krosnick, J.A. (1985). The measurement of values in surveys: A comparison of ratings and rankings. *Public Opinion Quarterly,* 49, 535–552.

Reprinted in Singer, E., & Presser, S. (Eds.) (1989). *Survey research methods: A reader.* Chicago: University of Chicago Press.

Reprinted in Bartholomew, D. (Ed.) (2006). *Measurement.* Oxford, UK: The Bardwell Press.

Schuman, H., Ludwig, J., & Krosnick, J.A. (1986). The perceived threat of nuclear war, salience, and open questions. *Public Opinion Quarterly,* 50, 519–536.

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Krosnick, J.A. (1990). Expertise in political psychology. *Social Cognition,* 8, 1–8. (also in J. Krosnick (Ed.), *Thinking about politics: Comparisons of experts and novices.* New York: Guilford, 1990, pp. 1–8).

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Alwin, D.F., & Krosnick, J.A. (1991). Aging, cohorts, and the stability of sociopolitical orientations over the life span. *American Journal of Sociology,* 97, 169–195.

Alwin, D.F., & Krosnick, J.A. (1991). The reliability of survey attitude measurement: The influence of question and respondent attributes. *Sociological Methods and Research,* 20, 139–181.

Judd, C.M., Drake, R.A., Downing, J.W., & Krosnick, J.A. (1991). Some dynamic properties of attitude structures: Context induced response facilitation and polarization. *Journal of Personality and Social Psychology,* 60, 193–202.

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Alwin, D.F., & Krosnick, J.A. (1988). The reliability of attitudinal survey data. Paper presented at the International Conference on Social Science Methodology, Dubrovnik, Yugoslavia.

Alwin, D.F., & Krosnick, J.A. (1988). Aging, cohort stability, and change in sociopolitical attitudes: Exploring the generational-persistence model. Paper presented at the International Society of Political Psychology Annual Meeting, Secaucus, New Jersey.

Krosnick, J.A., & Kinder, D.R. (1988). Altering the foundations of popular support for the president through priming: Reagan, the Iran-Contra affair, and the American public. Paper presented at the American Political Science Association Annual Meeting, Washington, D.C.

Krosnick, J.A., & Weisberg, H.F. (1988). Liberal/conservative ideological structures in the mass public: A study of attitudes toward politicians and social groups. Paper presented at the American Political Science Association Annual Meeting, Washington, D.C.

Krosnick, J.A. (1988). Government policy and citizen passion: A study of issue publics in contemporary America. Paper presented at the Shambaugh Conference on Communication, Cognition, Political Judgment, and Affect, Iowa City, Iowa.

Berent, M.K., Krosnick, J.A., & Boninger, D.S. (1989). Attitude importance and the valanced recall of relevant information. Paper presented at the Midwest Psychological Association Annual Meeting, Chicago, Illinois.

Betz, A., & Krosnick, J.A. (1989). Can people detect the affective tone of subliminally presented stimuli? Paper presented at the Midwest Psychological Association Annual Meeting, Chicago, Illinois.

Krosnick, J.A., & Berent, M.K. (1989). Age-related changes in peer and parental influence on heavy television viewing among children and adolescents. Paper presented at the Midwest Psychological Association Annual Meeting, Chicago, Illinois.

Alwin, D.F., & Krosnick, J.A. (1989). The reliability of attitudinal survey data. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Petersburg, Florida.

Krosnick, J.A. (1989). The implications of social psychological findings on compliance for recruiting survey respondents. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Petersburg, Florida.

Telhami, S., & Krosnick, J.A. (1989). Public attitudes and American policy toward the Arab-Israeli conflict. Paper presented at the International Society of Political Psychology Annual Meeting, Israel.

Krosnick, J.A., & Alwin, D.F. (1989). Symbolic versus non-symbolic political attitudes: Is there a distinction? Paper presented at the American Political Science Association Annual Meeting, Atlanta, Georgia.

Krosnick, J.A. (1989). The impact of cognitive sophistication and attitude importance on response order effects and question order effects. Paper presented at the conference entitled *Order effects in social and psychological research,* Nags Head Conference Center, Kill Devil Hills, North Carolina.

Krosnick, J.A. (1990). The impact of satisficing on survey data quality. Paper presented at the Annual Research Conference of the Bureau of the Census, U.S. Department of Commerce, Washington, D.C.

Krosnick, J.A. (1990). New perspectives on survey questionnaire construction: Lessons from the cognitive revolution. Invited presentation at the 1990 Technical Conference of the United States General Accounting Office, College Park, Maryland.

Krosnick, J.A. (1990). Americans' perceptions of presidential candidates: A test of the projection hypothesis. Paper presented at the Midwest Political Science Association Annual Meeting, Chicago, Illinois.

Krosnick, J.A., & Berent, M.K. (1990). The impact of verbal labeling of response alternatives and branching on attitude measurement reliability in surveys. Paper presented at the American Association for Public Opinion Research Annual Meeting, Lancaster, Pennsylvania.

Krosnick, J.A., & Alwin, D.F. (1990). The stability of political preferences: Comparisons of symbolic and non-symbolic attitudes. Paper presented at the International Society of Political Psychology Annual Meeting, Washington, D.C.

Krosnick, J.A. (1990). Confounding of attitude objects with attitude measurement techniques in studies of political attitude stability. Paper presented at the Summer Institute in Survey Research Techniques, University of Michigan.

Fabrigar, L.R., & Krosnick, J.A. (1991). The effect of question order and attitude importance on the false consensus effect. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Berent, M.K., & Krosnick, J.A. (1991). Attitude measurement reliability: The impact of verbal labeling of response alternatives and branching. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Lehman, D.R., Krosnick, J.A., West, R.L., & Li, F. (1991). The focus of judgment effect: A question wording effect due to hypothesis confirmation bias. Paper presented at the American Association for Public Opinion Research Annual Meeting, Phoenix, Arizona.

Krosnick, J.A., Boninger, D.S., Chuang, Y.C., & Carnot, C.G. (1991). Attitude strength: One construct or many related constructs? Paper presented at the Nags Head Conference on Attitude Strength, Nags Head, North Carolina.

Krosnick, J.A. (1991). Research on attitude importance: A summary and integration. Paper presented at the Nags Head Conference on Attitude Strength, Nags Head, North Carolina.

Krosnick, J.A., & Berent, M.K. (1991). Memory for political information: The impact of attitude importance on selective exposure, selective elaboration, and selective recall. Paper presented at the Society for Experimental Social Psychology Annual Meeting, Columbus, Ohio.

Krosnick, J.A., & Brannon, L.A. (1992). The impact of war on the ingredients of presidential evaluations: George Bush and the Gulf conflict. Paper presented at the Conference on the Political Consequences of War, The Brookings Institution, Washington, D.C.

Berent, M.K., & Krosnick, J.A. (1992). The relation between attitude importance and knowledge structure. Paper presented at the Midwest Political Science Association Annual Meeting, Chicago, Illinois.

Smith, W.R., Culpepper, I.J., & Krosnick, J.A. (1992). The impact of question order on cognitive effort in survey responding. Paper presented at the Sixth National Conference on Undergraduate Research, University of Minnesota, Minneapolis, Minnesota.

Krosnick, J.A., & Brannon, L.A. (1992). The impact of war on the ingredients of presidential evaluations: George Bush and the Gulf conflict. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Petersburg, Florida.

Narayan, S.S., & Krosnick, J.A. (1992). Response effects in surveys as a function of cognitive sophistication. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Boninger, D.S., Krosnick, J.A., & Berent, M.K. (1992). Imagination, perceived likelihood, and self-interest: A path toward attitude importance. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Culpepper, I.J., Smith, W., & Krosnick, J.A. (1992). The impact of question order on satisficing in attitude surveys. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Berent, M.K., & Krosnick, J.A. (1992). Attitude importance, information accessibility, and attitude-relevant judgments. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Krosnick, J.A., & Brannon, L.A. (1992). The impact of war on the ingredients of presidential evaluations: George Bush and the Gulf conflict. Paper presented at the International Society of Political Psychology Annual Meeting, San Francisco, California.

Rahn, W.M., Krosnick, J.A., & Breuning, M. (1992). Rationalization and derivation processes in political candidate evaluation. Paper presented at the American Political Science Association Annual Meeting, Chicago, Illinois.

Krosnick, J.A., & Brannon, L.A. (1992). Effects of knowledge, interest, and exposure on news media priming effects: Surprising results from multivariate analysis. Paper presented at the Society for Experimental Social Psychology Annual Meeting, San Antonio, Texas.

Berent, M.K., & Krosnick, J.A. (1993). Attitude importance and selective exposure to attitude-relevant information. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Fabrigar, L.R., & Krosnick, J.A. (1993). The impact of personal and national importance judgments on political attitudes and behavior. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Miller, J.M., & Krosnick, J.A. (1993). The effects of candidate ballot order on election outcomes. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Narayan, S.S., & Krosnick, J.A. (1993). Questionnaire and respondents characteristics that cause satisficing in attitude surveys. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Narayan, S.S., & Krosnick, J.A. (1993). Response effects in surveys as a function of cognitive sophistication. Paper presented at the American Psychological Society Annual Meeting, Chicago, Illinois.

Smith, W.R., & Krosnick, J.A. (1993). Need for cognition, prior thought, and satisficing in attitude surveys. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Smith, W.R., & Krosnick, J.A. (1993). Cognitive and motivational determinants of satisficing in surveys. Paper presented at the American Psychological Society Annual Meeting, Chicago, Illinois.

Berent, M.K., & Krosnick, J.A. (1994). Attitude importance and selective exposure to attitude-relevant information. Paper presented at the Midwest Political Science Association Annual Meeting, Chicago, Illinois.

Fabrigar, L.R., & Krosnick, J.A. (1994). The impact of attitude importance on consistency among attitudes. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Krosnick, J.A. (1994). Survey methods and survey results: Overturing conventional wisdom. Paper presented to the American Marketing Association, Columbus Chapter.

Krosnick, J.A., & Fabrigar, L.R. (1994). Attitude recall questions: Do they work? Paper presented at the American Association for Public Opinion Research Annual Meeting, Danvers, Massachusetts.

Miller, J.M., & Krosnick, J.A. (1994). Does accessibility mediate agenda-setting and priming? Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Smith, W.R., & Krosnick, J.A. (1994). Sources of non-differentiation and mental coin-flipping in surveys: Tests of satisficing hypotheses. Paper presented at the American Association for Public Opinion Research Annual Meeting, Danvers, Massachusetts.

Visser, P.S., & Krosnick, J.A. (1994). Mail surveys for election forecasting? An evaluation of the Columbus Dispatch Poll. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Visser, P.S., Krosnick, J.A., & Curtin, M. (1994). Mail surveys for election forecasting? Paper presented at the American Association for Public Opinion Research Annual Meeting, Danvers, Massachusetts.

Krosnick, J.A., & Brannon, L.A. (1995). News media priming and the 1992 U.S. presidential election. Paper presented at the American Political Science Association Annual Meeting, Chicago, Illinois.

Krosnick, J.A., & Cornet, P.J. (1995). Attitude importance and attitude change revisited: Shifts in attitude stability and measurement reliability across a presidential election campaign. Paper presented at the American Psychological Society Annual Meeting, New York, New York.

Krosnick, J.A., & Fabrigar, L.R. (1995). Designing rating scales for effective measurement in surveys. Invited address at the International Conference on Survey Measurement and Process Quality, Bristol, England.

Krosnick, J.A., Narayan, S.S., & Smith, W.R. (1995). The causes of survey satisficing: Cognitive skills and motivational factors. Paper presented at the Midwest Association for Public Opinion Research, Chicago, Illinois.

Miller, J.M., Fabrigar, L.R., & Krosnick, J.A. (1995). Contrasting attitude importance and collective issue importance: Attitude properties and consequences. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Miller, J.M., & Krosnick, J.A. (1995). Ballot order effects on election outcomes. Paper presented at the Midwest Political Science Association Annual Meeting, Chicago, Illinois.

Miller, J.M., & Krosnick, J.A. (1995). Mediators and moderators of news media priming: It ain't accessibility, folks. Paper presented at the International Society of Political Psychology Annual Meeting, Washington, D.C.

Narayan, S.S., & Krosnick, J.A. (1995). Education moderates response effects in surveys. Paper presented at the American Association for Public Opinion Research Annual Meeting, Ft. Lauderdale, Florida.

Smith, W.R., & Krosnick, J.A. (1995). Mental coin-flipping and non-differentiation in surveys: Tests of satisficing hypotheses. Invited address at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Visser, P.S., & Krosnick, J.A. (1995). The relation between age and susceptibility to attitude change: A new approach to an old question. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Visser, P.S., & Krosnick, J.A. (1995). Mail surveys win again: Some explanations for the superior accuracy of the Columbus Dispatch poll. Paper presented at the American Association for Public Opinion Research Annual Meeting, Ft. Lauderdale, Florida.

Ankerbrand, A.L., Krosnick, J.A., Cacioppo, J.T., & Visser, P.S. (1996). Candidate assessments and evaluative space. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Bizer, G.Y., & Krosnick, J.A. (1996). Attitude accessibility and importance revisited. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Krosnick, J.A. (1996). Linking survey question structure to data quality: The impact of no-opinion options. Paper presented at the conference on "Quality Criteria in Survey Research," sponsored by the World Association for Public Opinion Research, Cadenabbia, Italy.

Krosnick, J.A., & Brannon, L.A. (1996). News media priming during the 1992 U.S. presidential election campaign. Paper presented at the International Society of Political Psychology Annual Meeting, Vancouver, British Columbia.

Miller, J.M., Fabrigar, L.R., & Krosnick, J.A. (1996). The roles of personal importance and national importance in motivating issue public membership. Paper presented at the Midwest Political Science Association Annual Meeting, Chicago, Illinois.

Miller, J.M., & Krosnick, J.A. (1996). Can issue public membership be triggered by the threat of a policy change? Paper presented at the International Society of Political Psychology Annual Meeting, Vancouver, British Columbia.

Krosnick, J.A., & Visser, P.S. (1996). Changes in political attitude strength through the life cycle. Paper presented at the Society for Experimental Social Psychology Annual Meeting, Sturbridge, Massachusetts.

Miller, J.M., & Krosnick, J.A. (1997). The impact of policy change threat on issue public membership. Paper presented at the Midwest Political Science Association Annual Meeting, Chicago, Illinois.

Ankerbrand, A.L., Krosnick, J.A., Cacioppo, J.T., Visser, P.S., & Gardner, W. (1997). Attitudes toward political candidates predict voter turnout. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Ankerbrand, A.L., & Krosnick, J.A. (1997). Response order effects in dichotomous questions: A social desirability explanation. Paper presented at the American Psychological Society Annual Meeting, Washington, DC.

Krosnick, J.A. (1997). Miraculous accuracy in political surveys: The keys to success. Presentation in the Federation of Behavioral, Psychological, and Cognitive Sciences Seminar on Science and Public Policy, Library of Congress, Washington, D.C.

Krosnick, J.A. (1997). Non-attitudes and no-opinion filters. Paper presented at the Conference on no opinion, instability, and change in public opinion research. University of Amsterdam, the Netherlands.

Krosnick, J.A. (1997). Attitude strength. Paper presented at the Conference on no opinion, instability, and change in public opinion research. University of Amsterdam, the Netherlands.

Bizer, G.Y., & Krosnick, J.A. (1998). The relation between attitude importance and attitude accessibility. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Holbrook, A., Krosnick, J.A., Carson, R.T., & Mitchell, R.C. (1998). Violating conversational conventions disrupts cognitive processing of survey questions. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Louis, Missouri.

Krosnick, J.A. (1998). Applying stated preference methods to assessing the value of public goods. Paper presented at the National Oceanic and Atmospheric Administration Application of Stated Preference Methods to Resource Compensation Workshop, Washington, DC.

Krosnick, J.A. (1998). Implications of psychological research on justice and compensation for handling of natural resource damage cases. Paper presented at the National Oceanic and Atmospheric Administration Application of Stated Preference Methods to Resource Compensation Workshop, Washington, DC.

Krosnick, J.A. (1998). Acquiescence: How a standard practice in many survey organizations compromises data quality. Paper presented at the conference on "Quality Criteria in Survey Research," sponsored by the World Association for Public Opinion Research, Cadenabbia, Italy.

Krosnick, J.A., Lacy, D., & Lowe, L. (1998). When is environmental damage Americans' most important problem? A test of agenda-setting vs. the issue-attention cycle. Paper presented at the International Society of Political Psychology Annual Meeting, Montreal, Quebec, Canada.

Visser, P.S., Krosnick, J.A., Marquette, J., & Curtin, M. (1998). Improving election forecasting: Allocation of undecided respondents, identification of likely voters, and response order effects. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Louis, Missouri.

Krosnick, J.A. (1998). The impact of science on public opinion: How people judge the national seriousness of global warming and form policy preferences. Paper presented at the American Political Science Association Annual Meeting, Boston, Massachusetts.

Krosnick, J.A. (1998). Response choice order and attitude reports: New evidence on conversational conventions and information processing biases in voting and in election forecasting polls. Paper presented at the Society of Experimental Social Psychology Annual Meeting, Lexington, Kentucky.

Krosnick, J.A. (1998). The impact of the Fall 1997 debate about global warming on American public opinion. Paper presented at Resources for the Future, Washington, D.C.

Krosnick, J.A. (1998). What the American public believes about global warming: Results of a national longitudinal survey study. Paper presented at the Amoco Public and Government Affairs and Government Relations Meeting, Woodruff, Wisconsin.

Krosnick, J.A. (1998). What the American public believes about global warming: Results of a national longitudinal survey study. Paper presented in the Second Annual Carnegie Lectures on Global Environmental Change, Carnegie Museum of Natural History, Pittsburgh, Pennsylvania.

Green, M.C., & Krosnick, J.A. (1999). Survey satisficing: Telephone interviewing increases non-differentiation and no opinion responses. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Green, M.C., & Krosnick, J.A. (1999). Comparing telephone and face-to-face interviewing in terms of data quality: The 1982 National Election Studies Method Comparison Project. Paper presented at the Seventh Annual Conference on Health Survey Research Methods, Williamsburg, Virginia.

Holbrook, A.L., Krosnick, J.A., Carson, R.T., & Mitchell, R.C. (1999). Violating conversational conventions disrupts cognitive processing of attitude questions. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Petersburg, Florida.

Krosnick, J.A. (1999). What happens when survey respondents don't try very hard? The notion of survey satisficing. Paper presented at the National Center for Social Research, London, United Kingdom.

Krosnick, J.A. (1999). Satisficing: A single explanation for a wide range of findings in the questionnaire design literature. Paper presented at Linking the Path: A Conference for Analysts, Researchers, and Consultants, sponsored by the Gallup Organization, Lincoln, Nebraska.

Krosnick, J.A. (1999). Methodology for the NAOMS Survey. Presentation at the Workshop on the Concept of the National Aviation Operations Monitoring System (NAOMS), Sponsored by the National Aeronautics and Space Administration, Alexandria, Virginia.

Krosnick, J.A. (1999). Refining measurement of public values for policy-making: A test of contingent valuation procedures. Paper presented at the American Political Science Association Annual Meeting, Atlanta, Georgia.

Krosnick, J.A. (1999). The threat of satisficing in surveys: The shortcuts respondents take in answering questions. Paper presented at the National Center for Social Research Survey Methods Seminar on Survey Data Quality, London, England.

Krosnick, J.A. (1999). Optimizing questionnaire design: How to maximise data quality. Paper presented at the National Center for Social Research Survey Methods Seminar on Survey Data Quality, London, England.

Krosnick, J.A. (1999). The causes and consequences of no-opinion responses in surveys. Paper presented at the International Conference on Survey Nonresponse, Portland, Oregon.

Miller, J.M., & Krosnick, J.A. (1999). The impact of threats and opportunities on political participation. Paper presented at the Midwest Political Science Association Annual Meeting, Chicago, Illinois.

O'Muircheartaigh, C., Krosnick, J.A., & Helic, A. (1999). Middle alternatives, acquiescence, and the quality of questionnaire data. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Petersburg, Florida.

Bizer, G.Y., & Krosnick, J.A. (2000). The importance and accessibility of attitudes: Helping explain the structure of strength-related attitude attributes. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Holbrook, A.L., Krosnick, J.A., Visser, P.S., Gardner, W.L., & Cacioppo, J.T. (2000). The formation of attitudes toward presidential candidates and political parties: An asymmetric nonlinear process. Paper presented at the American Psychological Society Annual Meeting, Miami, Florida.

Holbrook, A.L., Krosnick, J.A., Visser, P.S., Gardner, W.L., & Cacioppo, J.T. (2000). The formation of attitudes toward presidential candidates and political parties: An asymmetric, nonlinear, interactive process. Paper presented at the American Political Science Association Annual Meeting, Washington, D.C.

Krosnick, J.A. (2000). Peering into the future of thinking and answering: A psychological perspective on internet survey respondents. Paper presented at *Survey Research: Past, Present, and Internet,* the 2000 Nebraska Symposium on Survey Research, University of Nebraska, Lincoln, Nebraska.

Krosnick, J.A. (2000). The present and future of research on survey non-responses: Reflections on Portland '99 and beyond. Roundtable presentation at the American Association for Public Opinion Research Annual Meeting, Portland, Oregon.

Holbrook, A.L., Krosnick, J.A., Moore, D.W., & Tourangeau, R. (2000). Response order effects in Gallup surveys: Linguistic structure and the impact of respondent ability, motivation, and task difficulty. Paper presented at the American Association for Public Opinion Research Annual Meeting, Portland, Oregon.

Miller, J.M., Krosnick, J.A., & Lowe, L. (2000). The impact of policy change threat on financial contributions to interest groups. Paper presented at an invited conference, Political Participation: Building a Research Agenda, Center for the Study of Democratic Politics, Princeton University, Princeton, New Jersey.

Miller, J.M., & Krosnick, J.A. (2000). Attitude change outside the laboratory: News media "priming" turns out not to be priming after all. Paper presented at the Society of Experimental Social Psychology Annual Meeting, Atlanta, Georgia.

Saris, W., & Krosnick, J.A. (2000). The damaging effect of acquiescence response bias on answers to agree/disagree questions. Paper presented at the American Association for Public Opinion Research Annual Meeting, Portland, Oregon.

Visser, P.S., & Krosnick, J.A. (2000). Exploring the distinct mechanisms through which strength-related attitude attributes confer resistance to attitude change. Paper presented at the Society for Personality and Social Psychology Annual Meeting, Nashville, Tennessee.

Bizer, G.Y., & Krosnick, J.A. (2001). Need to evaluate and need for cognition predict political attitudes and behavior. Paper presented at the Midwestern Psychological Association, Chicago, Illinois.

Krosnick, J.A. (2001). Who shapes public policy? Presentation made at the Annual Conference of the Ohio Farm Bureau Federation, Columbus, Ohio.

Krosnick, J.A., & Bizer, G.Y. (2001). Exploring the structure of strength-related attitude features: The relation between attitude importance and attitude accessibility. Paper presented at the Society for Personality and Social Psychology Annual Meeting, San Antonio, Texas.

Krosnick, J.A., Visser, P.S., & Holbrook, A.L. (2001). Real-time attitude change outside the laboratory: The case of the 1997 national debate on global warming. Paper presented at the Society for Personality and Social Psychology Annual Meeting, San Antonio, Texas.

Krosnick, J.A., & Miller, J.M. (2001). An unrecognized need for ballot reform: Effects of candidate name order. Paper presented at the conference entitled *Election Reform: 2000 and Beyond,* sponsored by the USC-Caltech Center for the Study of Law and Politics and the Jesse M. Unruh Institute of Politics, University of Southern California, Los Angeles, California.

Miller, J.M., & Krosnick, J.A. (2001). What motivates political cognition and behavior? Paper presented at the Midwest Political Science Association Annual Meeting, Chicago, Illinois.

Green, M.C., Krosnick, J.A., & Holbrook, A.L. (2001). Experimental comparisons of the quality of data obtained from face-to-face and telephone surveys. Paper presented at the American Association for Public Opinion Research Annual Meeting, Montreal, Canada.

Silver, M.D., & Krosnick, J.A. (2001). An experimental comparison of the quality of data obtained in telephone and self-administered mailed surveys with a listed sample. Paper presented at the American Association for Public Opinion Research Annual Meeting, Montreal, Canada.

Chang, L., & Krosnick, J.A. (2001). The representativeness of national samples: Comparisons of an RDD telephone survey with matched Internet surveys by Harris Interactive and Knowledge Networks. Paper presented at the American Association for Public Opinion Research Annual Meeting, Montreal, Canada.

Chang, L., & Krosnick, J.A. (2001). The accuracy of self-reports: Comparisons of an RDD telephone survey with Internet Surveys by Harris Interactive and Knowledge Networks. Paper presented at the American Association for Public Opinion Research Annual Meeting, Montreal, Canada.

O'Muircheartaigh, C., & Krosnick, J.A. (2001). A cross-national comparison of middle alternatives, acquiescence, and the quality of questionnaire data. Paper presented at the American Association for Public Opinion Research Annual Meeting, Montreal, Canada.

Marquette, J., Green, J., & Krosnick, J.A. (2001). Experimental analysis of the accuracy of pre-election vote choice reports. Paper presented at the American Association for Public Opinion Research Annual Meeting, Montreal, Canada.

Holbrook, A.L., Krosnick, J.A., Carson, R.T., & Mitchell, R.C. (2001). Violating conversational conventions disrupts cognitive processing of attitude questions. Paper presented at the 2001 Fifth Tri-Annual UC Berkeley Invitational Choice Symposium, Pacific Grove, California.

Krosnick, J.A. (2001). Americans' perceptions of the health risks of cigarette smoking: A new opportunity for public education. Paper presented at the invited conference "Survey Research on Household Expectations and Preferences," Institute for Social Research, University of Michigan, Ann Arbor, Michigan.

McCready, W., Skitka, L., & Krosnick, J.A. (2001). Using a web-enabled national panel to conduct social psychological experiments. Workshop presented at the Society of Experimental Social Psychology Annual Meeting, Spokane, Washington.

Krosnick, J.A., Courser, M., Mulligan, K., & Chang, L. (2001). Exploring the determinants of vote choices in the 2000 Presidential election: Longitudinal analyses to document causality. Paper presented at the American Political Science Association Annual Meeting, San Francisco, California.

Silver, M.D., & Krosnick, J.A. (2001). Optimizing survey measurement accuracy by matching question design to respondent memory organization. Paper presented at the Federal Committee on Statistical Methodology Research Conference, Arlington, Virginia.

Krosnick, J.A., Courser, M., Mulligan, K., & Chang, L. (2002). Exploring the causes of vote choice in the 2000 Presidential election: Longitudinal analyses to document the causal determinants of candidate preferences. Paper presented at a conference entitled "Assessing the Vitality of Electoral Democracy in the U.S.: The 2000 Election," The Mershon Center, Ohio State University, Columbus, Ohio.

Miller, J.M., & Krosnick, J.A. (2002). Mediators and moderators of news media agenda-setting. Paper presented at the Midwest Political Science Association Annual Meeting, Chicago, Illinois.

Shaeffer, E.M., Krosnick, J.A., & Holbrook, A.L. (2002). Assessing the efficacy of object rankings following ratings. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Lampron, S., Krosnick, J.A., Petty, R.E., & See, M. (2002). Self-interest, values, involvement, and susceptibility to attitude change. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Krosnick, J.A. (2002). Comments on Baruch Fischhoff's "Environmental Risk: What's Worth Knowing—and Saying?" Paper presented at the 2nd Annual Public Policy Symposium, "Responding to Contemporary Environmental Risks." Sponsored by the Ohio State University Environmental Policy Initiative, Fischer College of Business, Ohio State University, Columbus, Ohio.

Thomas, R.K., Uldall, B.R., & Krosnick, J.A. (2002). More is not necessarily better: Effects of response categories on measurement stability and validity. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Petersburg, Florida.

Uldall, B.R., Thomas, R.K., & Krosnick, J.A. (2002). Reliability and validity of web-based surveys: Effects of response modality, item format, and number of categories. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Petersburg, Florida.

Shook, N., Krosnick, J.A., & Thomas, R.K. (2002). Following the storm: Public opinion changes and political reactions in surveys. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Petersburg, Florida.

Chang, L., & Krosnick, J.A. (2002). Comparing self-administered computer surveys and auditory interviews: An experiment. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Petersburg, Florida.

Silver, M.D., & Krosnick, J.A. (2002). Optimizing survey measurement accuracy by matching question design to respondent memory organization. Paper presented at the American Association for Public Opinion Research Annual Meeting, St. Petersburg, Florida.

Krosnick, J.A., Visser, P.S., Holbrook, A.L., & Berent, M.K. (2002). Challenging the common-factor model of strength-related attitude attributes: Contrasting the antecedents and consequences of attitude importance and attitude-relevant knowledge. Paper presented at the General Meeting of the European Association of Experimental Social Psychology, San Sebastian, Spain.

Krosnick, J.A., Miller, J.M., & Tichy, M.P. (2002). An unrecognized need for ballot reform: Effects of candidate name order. Paper presented at the International Society for Political Psychology Annual Meeting, Berlin, Germany.

Chang, L., & Krosnick, J.A. (2002). RDD telephone vs. Internet survey methodology for studying American presidential elections: Comparing sample representativeness and response quality. Paper presented at the American Political Science Association Annual Meeting, Boston, Massachusetts.

Bizer, G.Y., Krosnick, J.A., Holbrook, A.L., Petty, R.E., Rucker, D.D., & Wheeler, S.C. (2002). The impact of personality on electoral behavior and cognition: A study of need for cognition and need to evaluate. Paper presented at the American Political Science Association Annual Meeting, Boston, Massachusetts.

Krosnick, J.A., Visser, P.S., & Holbrook, A.L. (2002). Social psychology under the microscope: Do classic experiments replicate when participants are representative of the general public rather than convenience samples of college students? Paper presented at the Society of Experimental Social Psychology Annual Meeting, Columbus, Ohio.

Visser, P.S., Krosnick, J.A., Simmons, J. (2002). Distinguishing the cognitive and behavioral consequences of attitude importance and certainty. Paper presented at the Society of Experimental Social Psychology Annual Meeting, Columbus, Ohio.

Chang, L., & Krosnick, J.A. (2002). RDD telephone vs. Internet survey methodology for studying American presidential elections: Comparing sample representativeness and response quality. Invited presentation at Westat, Rockville, Maryland.

Chang, L., & Krosnick, J.A. (2002). Comparing the quality of data obtained from telephone and Internet surveys: Field and laboratory experiments. Invited paper presented at the FCSM Statistical Policy Seminar “Challenges to the Federal Statistical System in Fostering Access to Statistics.’ Bethesda, Maryland.

Lampron, S.F., Krosnick, J.A., Shaeffer, E., Petty, R.E., & See, M. (2003). Different types of involvement moderate persuasion (somewhat) differently: Contrasting outcome-based and value-based involvement. Paper presented at the Society for Personality and Social Psychology Annual Meeting, Los Angeles, California.

Visser, P.S., & Krosnick, J.A. (2003). Attitude strength: New insights from a life-course development perspective. Paper presented at the Society for Personality and Social Psychology Annual Meeting, Los Angeles, California.

Krosnick, J.A. (2003). Basic methodological work for and in repeated cross-sectional and longitudinal surveys: A few thoughts. Paper presented at the National Science Foundation Workshop on Repeated Cross-sectional and Longitudinal Surveys, Arlington, Virginia.

Pfent, A.M., & Krosnick, J.A. (2003). Rationalization of presidential candidate preferences. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Holbrook, A.L., & Krosnick,, J.A. (2003). Meta-psychological and operative measures of psychological constructs: The same or different? Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Krosnick, J.A., Visser, P.S., & Holbrook, A.L. (2003). Social psychology under the microscope: Do classic experiments replicate when participants are representative of the general public rather than convenience samples of college students? Invited presentation at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Saris, W.E., Krosnick, J.A., & Shaeffer, E.M. (2003). Comparing the quality of agree/disagree and balanced forced choice questions via an MTMM experiment. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Anand, S., & Krosnick, J.A. (2003). Satisficing in attitude surveys: The impact of cognitive skills and motivation on response effects. Paper presented at the Midwestern Psychological Association Annual Meeting, Chicago, Illinois.

Bizer, G.Y., Krosnick, J.A., Holbrook, A.L., Petty, R.E., Rucker, D.D., & Wheeler, S.C. (2003). The impact of personality on political beliefs, attitudes, and behavior: Need for cognition and need to evaluate. Paper presented at the American Psychological Society Annual Meeting, Atlanta, Georgia.

Holbrook, A.L., Pfent, A., & Krosnick J.A. (2003). Response rates in recent surveys conducted by non-profits and commercial survey agencies and the news media. Paper presented at the American Association for Public Opinion Research Annual Meeting, Nashville, Tennessee.

Shaeffer, E.M., Langer, G.E., Merkle, D.M., & Krosnick, J.A. (2003). A comparison of minimal balanced and fully balanced forced choice items. Paper presented at the American Association for Public Opinion Research Annual Meeting, Nashville, Tennessee.

Pfent, A., Krosnick, J.A., & Courser, M. (2003). Rationalization and derivation processes in presidential elections: New evidence about the determinants of citizens' vote choices. Paper presented at the American Association for Public Opinion Research Annual Meeting, Nashville, Tennessee.

Krosnick, J.A., Visser, P.S., & Holbrook, A.L. (2003). How to conceptualize attitude strength and how to measure it in surveys: Psychological perspectives. Paper

presented at the American Association for Public Opinion Research Annual Meeting, Nashville, Tennessee.

Chang, L., & Krosnick, J.A. (2003). Comparing data quality in telephone and internet surveys: Results of lab and field experiments. Invited paper presented at the American Statistical Association Annual Meetings, San Francisco, California.

Pfent, A., & Krosnick, J.A. (2003). Post-decisional dissonance reduction by a new method: Rationalization of political candidate choices illuminates the basic dynamics of decision-making. Paper presented at the Society of Experimental Social Psychology Annual Meeting, Boston, Massachusetts.

Krosnick, J.A., & Fabrigar, L.R. (2003). "Don't know" and "no opinion" responses: What they mean, why they occur, and how to discourage them. Invited paper presented at the Basel Workshop on Item Non-response and Data Quality in Large Social Surveys, University of Basel, Basel, Switzerland.

Krosnick, J. A.(2003). Comments on theories of persuasion. Invited discussant at the conference entitled "Integrating Message Effects and Behavior Change Theories in Cancer Prevention, Treatment, and Care," Annenberg Public Policy Center, Annenberg School for Communication, University of Pennsylvania, Philadelphia, Pennsylvania.

Krosnick, J.A. (2003). Survey methodology—scientific basis. Presentation at the National Aviation Operations Monitoring Service Working Group Meeting #1, Seattle, Washington.

Krosnick, J.A. (2003). Survey methodology—NAOMS design decisions. Presentation at the National Aviation Operations Monitoring Service Working Group Meeting #1, Seattle, Washington.

Krosnick, J.A. (2004). Survey methodology—scientific basis. Presentation at the National Transportation Safety Board, Washington, DC.

Krosnick, J.A. (2004). Survey methodology—NAOMS design decisions. Presentation at the National Transportation Safety Board, Washington, DC.

Krosnick, J.A. (2004). Public uses of the news media. Presentation as a part of the symposium "Politics and the media," Social Sciences Resource Center, Stanford Libraries, Stanford University, Stanford, CA.

Krosnick, J.A. (2004). Peering into the minds of respondents: The cognitive and social processes underlying answers to survey questions. Invited keynote lecture at the International Symposium in Honour of Paul Lazarsfeld, Katholieke Universiteit Leuven (Belgium).

Krosnick, J.A., Shook, N., & Thomas, R.K. (2004). Public opinion change in the aftermath of 9/11. Paper presented at the American Association for Public Opinion Research Annual Meeting, Phoenix, Arizona.

Holbrook, A.L., & Krosnick, J.A. (2004). Vote over-reporting: A test of the social desirability hypothesis. Paper presented at the American Association for Public Opinion Research Annual Meeting, Phoenix, Arizona.

Chang, L., & Krosnick, J.A. (2004). Assessing the accuracy of event rate estimates from national surveys. Paper presented at the American Association for Public Opinion Research Annual Meeting, Phoenix, Arizona.

Shaeffer, E.M., Lampron, S.F., Krosnick, J.A., Tompson, T.N., Visser, P.S., & Hanemann, W.M. (2004). A comparison of open vs. closed survey questions for valuing environmental goods. Paper presented at the American Association for Public Opinion Research Annual Meeting, Phoenix, Arizona.

Holbrook, A.L., Berent, M.K., Krosnick, J.A., Visser, P.S., & Boninger, D.S. (2004). Attitude importance and the accumulation of attitude-relevant knowledge in memory. Paper presented at the American Political Science Association Annual Meeting, Chicago, Illinois.

Chang, L., & Krosnick, J.A. (2004). Measuring the frequency of regular behaviors: Comparing the 'typical week' to the 'past week.' Paper presented at the American Political Science Association Annual Meeting, Chicago, Illinois.

Krosnick, J.A. (2004). What do Americans want government to do about global warming? Evidence from national surveys. Invited presentation at the "Workshop on Global Warming: The Psychology of Long Term Risk," Cooperative Institute for Climate Science, Woodrow Wilson School of Public and International Affairs, Princeton University, Princeton, New Jersey.

Krosnick, J.A., & Malhotra, N. (2004). The causes of vote choice in the 2004 American Presidential Election: Insights from the 2004 YouGov surveys. Paper pre-

sented at the conference “The 2004 American Presidential Election: Voter Decision-Making in a Complex World,” Stanford University, Stanford, California.

Krosnick, J.A., Visser, P.S., & Holbrook, A.L. (2004). The impact of social psychological manipulations embedded in surveys on special populations. Paper presented at the Pacific Chapter of the American Association for Public Opinion Research Annual Meeting, San Francisco, California.

Krosnick, J.A. (2005). The future of the American National Election Studies. Roundtable: The political psychology of surveys. Paper presented at the Midwestern Political Science Association Annual Meeting, Chicago, Illinois.

Malhotra, N., & Krosnick, J.A. (2005). What motivated Americans' views of the candidates and vote preferences across the 2004 presidential campaign? Paper presented at the American Association for Public Opinion Research Annual Meeting, Miami, Florida.

Garland, P., Krosnick, J.A., & Clark, H.H. (2005). Does question wording sometimes send unintended signals about expected answers? Paper presented at the American Association for Public Opinion Research Annual Meeting, Miami, Florida.

Callegaro, M., De Keulenaer, F., Krosnick, J.A., & Daves, R. (2005). Interviewer effects in an RDD telephone pre-election poll in Minneapolis 2001: An analysis of the effects of interviewer race and gender. Paper presented at the American Association for Public Opinion Research Annual Meeting, Miami, Florida.

Krosnick, J.A., & Rivers, D. (2005). Web survey methodologies: A comparison of survey accuracy. Paper presented at the American Association for Public Opinion Research Annual Meeting, Miami, Florida.

Holbrook, A.L., & Krosnick, J.A. (2005). Vote over-reporting: Testing the social desirability hypothesis in telephone and Internet surveys. Paper presented at the American Association for Public Opinion Research Annual Meeting, Miami, Florida.

Anand, S., Krosnick, J.A., Mulligan, K., Smith, W., Green, M., & Bizer, G. (2005). Effects of respondent motivation and task difficulty on nondifferentiation in ratings: A test of satisficing theory predictions. Paper presented at the American Association for Public Opinion Research Annual Meeting, Miami, Florida.

Rivers, D., & Krosnick, J.A. (2005). Comparing major survey firms in terms of survey satisficing: Telephone and internet data collection. Paper presented at the American Association for Public Opinion Research Annual Meeting, Miami, Florida.

Krosnick, J.A. (2005). Thought piece on survey participation. Paper presented at the conference entitled “New Approaches to Understanding Participation in Surveys,” Belmont Conference Center, Elkridge, Maryland.

Malhotra, N., & Krosnick, J.A. (2005). Pilot test of new procedures for identifying new and emerging occupations and their places in the SOC: A study of biotechnology. Paper presented at the U.S. Bureau of Labor Statistics, Washington, DC.

Holbrook, A.L., & Krosnick, J.A. (2005). Do survey respondents intentionally lie and claim that they voted when they did not? New evidence using he list and randomized response techniques. Paper presented at the American Political Science Association Annual Meeting, Washington, DC.

Malhotra, N., & Krosnick, J.A. (2005). The determinants of vote choice in the 2004 U.S. Presidential Election. Paper presented at the American Political Science Association Annual Meeting, Washington, DC.

Krosnick, J.A. (2005). Effects of survey data collection mode on response quality: Implications for mixing modes in cross-national studies. Paper presented at the conference “Mixed Mode Data Collection in Comparative Social Surveys,” City University, London, United Kingdom.

Krosnick, J.A., & Malhotra, N. (2006). The impact of presidential job performance assessments on vote choices in 2004. Paper presented at the conference “The Wartime Election of 2004,” Ohio State University, Columbus, Ohio.

Rabinowitz, J.L. & Krosnick, J.A. (2006). Investigating the discriminant validity of symbolic racism. Paper presented at the annual meeting of the Society for Personality and Social Psychology, Palm Springs, California.

Krosnick, J.A. (2006). An evaluation framework: Total survey error in research practice. Paper presented at the Survey Methods Symposium sponsored by Central Market Research and Insights, Microsoft, Redmond, Washington.

Krosnick, J.A. (2006). Data quality from phone vs. internet surveys. Paper presented at the Survey Methods Symposium sponsored by Central Market Research and Insights, Microsoft, Redmond, Washington.

Krosnick, J.A. (2006). The distinguishing characteristics of frequent survey participants. Paper presented at the annual meeting of the Midwest Political Science Association, Chicago, Illinois.

Krosnick, J.A. (2006). An overview of the mission of the American National Election Studies. Presentation at the annual meeting of the Midwest Political Science Association, Chicago, Illinois.

Krosnick, J.A. (2006). The use of the internet in valuation surveys. Presentation at the workshop "Morbidity and Mortality: How Do We Value the Risk of Illness and Death?", sponsored by the U.S. Environmental Protection Agency, the National Center for Environmental Research, and the National Council on Economic Education, Washington, DC.

Krosnick, J.A. (2006). What the American public thinks about climate change: Findings from a new Stanford/ABC/Time Magazine Survey. Presentation at the "California Climate Change Policy Workshop," sponsored by the Woods Institute for the Environment, California State Capital Building, Sacramento, California.

Holbrook, A.L., & Krosnick, J.A. (2006). Vote over-reporting: A test of the social desirability hypothesis. Paper presented at the American Psychological Association Annual Meeting, New Orleans, Louisiana.

Bannon, B., Krosnick, J.A., & Brannon, L. (2006). News media priming: Derivation or rationalization? Paper presented at the American Political Science Annual Meeting, Philadelphia, Pennsylvania.

Malhotra, N., Krosnick, J.S., & Thomas, R. (2006). The effect of polls on political behavior. Paper presented at the American Political Science Annual Meeting, Philadelphia, Pennsylvania.

Krosnick J.A. (2006). Doing social psychology that's relevant and valued and valuable. Paper presented at the Society of Experimental Social Psychology Annual Meeting, Philadelphia, Pennsylvania.

Krosnick, J.A. (2006). Overview of the American National Election Studies: Lessons learned about the causes of voter turnout and candidate choice. Paper presented at the conference "The Psychology of Voting and Election Campaigns," Social Science Research Institute, Duke University, Durham, North Carolina.

Krosnick, J.A. (2006). What Americans really think about climate change. Presentation to the Stanford Women's Club of the East Bay, Contra Costa County Library, Orinda, California.

Krosnick, J.A. (2006). The impact of survey mode and the merging of face-to-face recruitment with Internet data collection. Paper presented at the 2006 Federal Committee on Statistical Methodology Statistical Policy Seminar, "Keeping Current: What We Know—What We Need to Learn." Washington, DC.

Krosnick, J.A. (2006). Comparisons of the accuracy of information obtained by face-to-face, telephone, Internet, and paper and pencil data collection. Paper presented at the Pacific Chapter of the American Association for Public Opinion Research Annual Meeting, San Francisco, California.

Bizer, G.Y., Krosnick, J.A., Holbrook, A.L., Wheeler, S.C., Rucker, D.D., & Petty, R.E. (2007). The impact of personality on political beliefs, attitudes, and behavior: Need for cognition and need to evaluate. Paper presented at the Society for Personality and Social Psychology Annual Meeting, Memphis, Tennessee.

Sargent, M.J., Rabinowitz, J., Shull, A., & Krosnick, J.A. (2007). Support for government efforts to promote racial equality: Effects of antigroup affect and perceptions of value violation. Paper presented at the Society for Personality and Social Psychology Annual Meeting, Memphis, Tennessee.

Krosnick, J.A. (2007). Americans' beliefs about global climate change: New national survey findings. Paper presented at the American Association for the Advancement of Science Annual Meeting, San Francisco, California.

Krosnick, J.A. (2007). Comparisons of survey modes and a new hybrid. Paper presented at the American Association for the Advancement of Science Annual Meeting, San Francisco, California.

Garland, P., & Krosnick, J.A. (2007). The impact of race on evaluations of artistic products: Evidence of 'ownership' bias among prejudiced whites. Paper presented at the National Conference of Black Political Scientists, Burlingame, California.

Lupia, A., & Krosnick, J.A. (2007). Remaking the American National Election Studies. Paper presented at the National Conference of Black Political Scientists, Burlingame, California.

Krosnick, J.A. (2007). What Americans really think about climate change: Attitude formation and change in response to a raging scientific controversy. Presentation sponsored by the California Research Bureau at the California State House, Sacramento, California.

Harbridge, L., & Krosnick, J.A. (2007). Presidential approval and gas prices: The Bush presidency in historical context. Paper presented at the American Association for Public Opinion Research annual meeting, Garden Grove, California.

Krosnick, J.A., & Smith, T. (2007). Proposing questionnaire design experiments for the General Social Survey. Paper presented at the American Association for Public Opinion Research annual meeting, Garden Grove, California.

Cote, F., Tahk, A., & Krosnick, J.A. (2007). Comparing the validity of public predictions of changes in the economy: RDD telephone data vs. volunteer samples completing paper and pencil questionnaires. Paper presented at the American Association for Public Opinion Research annual meeting, Garden Grove, California.

Schneider, D., Krosnick, J.A., & Ophir, E. (2007). Ballot order effects in California from 1976 to 2006. Paper presented at the American Association for Public Opinion Research annual meeting, Garden Grove, California.

O'Muircheartaigh, C., Krosnick, J.A., & Dennis, J.M. (2007). Face-to-face recruitment of an Internet survey panel: Lessons from an NSF-sponsored demonstration project. Paper presented at the American Association for Public Opinion Research annual meeting, Garden Grove, California.

Malhotra, N., & Krosnick, J.A. (2007). The effect of survey mode and sampling on inferences about political attitudes and behavior: Comparing the 2000 and 2004 ANES to Internet surveys with non-probability samples. Paper presented at the American Association for Public Opinion Research annual meeting, Garden Grove, California.

Krosnick, J.A., Malhotra, N., & Miller, L. (2007). Survey mode in the 21st Century: Probability vs. non-probability samples of a nation's population. Paper presented at the conference entitled "Cyberinfrastructure and National Election Studies: The Wivenhoe House Conference." University of Essex, Colchester, UK.

Pasek, J., & Krosnick, J.A. (2007). Trends over time in America: Probability/telephone vs. non-probability/internet. Paper presented at the conference entitled "Cyberinfrastructure and National Election Studies: The Wivenhoe House Conference." University of Essex, Colchester, UK.

Krosnick, J.A. (2007). Methods and results from the New Scientist Survey on Climate Change Policy. Presentation at the National Press Club, Washington, DC.

Krosnick, J.A. (2007). The ANES Recompetition and its Implications for the GSS recompetition. Presentation at the American Sociological Association annual meeting, New York, New York.

Harder, J., & Krosnick, J.A., (2007). Causes of voter turnout: A social psychological perspective. Paper presented at the American Psychological Association annual meeting, San Francisco, California.

Schneider, D., Berent, M.K., Thomas, R., & Krosnick, J.A. (2007). Measuring customer satisfaction and loyalty: Improving the 'net promoter' score. Paper presented at the World Association for Public Opinion Research annual meeting, Berlin, Germany.

Cobb, C., & Krosnick, J.A. (2007). The impact of postdoc appointments on science and engineering career outcomes and job satisfaction. Paper presented at the conference "Using Human Resource Data," Science Resources Statistics Workshop, Washington, DC.

Off-Campus Academic Colloquia

1985—State University of New York at Stony Brook, Department of Political Science; Princeton University, Department of Sociology; Princeton University, Department of Politics; University of California at Berkeley, Department of Sociology; Yale University, Department of Sociology; Yale University, Department of Political Science; Ohio State University, Department of Psychology; University of Southern California, Annenberg School for Communication.

1986—University of Michigan, Department of Sociology.

1987—Yale University, Department of Psychology; Yale University, Department of Political Science; University of Michigan, Department of Sociology.

1988—University of Minnesota, Department of Political Science.

1990—University of Florida, Department of Psychology; University of Florida, Bureau of Economic and Business Research; Denison University, Department of Psychology.

1991—University of Michigan, Summer Institute in Survey Research Techniques.

1992—University of Michigan, Summer Institute in Survey Research Techniques; University of Michigan, Department of Communication.

1993—University of Wisconsin, Departments of Psychology, Sociology, and Political Science; University of Michigan, Summer Institute in Survey Research Techniques.

1994—Yale University, Department of Psychology; University of Michigan, Research Center for Group Dynamics; Cornell University, Peace Studies Center.

1995—University of Michigan, Summer Institute in Survey Research Techniques; University of Minnesota, Department of Political Science.

1996—University of Pennsylvania, Annenberg School for Communication; University of Chicago, Center for Decision Research; Purdue University, Department of Psychology.

1997—Stanford University, Department of Psychology; University of California–Berkeley, Institute of Governmental Studies; University of California–Berkeley, Institute of Personality and Social Research; University of California–Irvine, Department of Social Sciences; University of California–Los Angeles, Institute for Social Science Research; University of California–Santa Barbara, Department of Psychology; University of California–Santa Cruz, Board of Psychology; Center for Advanced Study in the Behavioral Sciences; London School of Economics and Political Science, Methodology Institute.

1998—Arizona State University, Department of Psychology; London School of Economics and Political Science, Methodology Institute; University of Amsterdam, Department of Psychology; Carnegie Mellon University, Center for the Integrated Study of the Human Dimensions of Global Change, Department of Engineering and Public Policy.

1999—University of Chicago, American Politics Workshop, Department of Political Science; Indiana University, Departments of Political Science and Psychology; University of Minnesota, Departments of Political Science and Psychology.

2000—University of California, Los Angeles, Department of Political Science; University of Southern California, Jesse M. Unruh Institute of Politics; University of Michigan, Institute for Social Research, Survey Research Center.

2001—The William and Flora Hewlett Foundation, Menlo Park, California; London School of Economics and Political Science, Methodology Institute; Resources for the Future, Washington, DC.

2002—University of Colorado–Boulder, Department of Psychology; University of Florida–Gainesville, Department of Psychology; Stanford University, Department of Communication; University of Chicago, Harris School of Public Policy; Uppsala University (Sweden), Department of Government; University of North Carolina, Department of Political Science; University of Chicago, Political Psychology Workshop, Departments of Psychology and Political Science; Pitzer College, Department of Political Science.

2003—University of Illinois at Chicago, College of Urban Planning and Public Affairs; University of Illinois at Chicago, Survey Research Laboratory; Stanford University, Social Psychology Research Seminar (April); Stanford University, Social Psychology Research Seminar (October); Stanford University, Department of Psychology Colloquium Series.

2004—Harvard University, Research Workshop in American Politics, Department of Government; Stanford University, Organizational Behavior Seminar, Graduate School of Business; Stanford University, Marketing Seminar, Graduate School of Business; Stanford University, American Empirical Seminar, Stanford Institute for the Quantitative Study of Society; University of California, Davis, Distinguished Lecture Series, Departments of Psychology and Political Science.

2005—The Rand Organization, Santa Monica, California.

2006—Harvard University, Department of Psychology; Duke University, Social Science Research Institute; University of North Carolina, Chapel Hill, Department of Political Science; University of Florida, Department of Psychology; University of Florida, Department of Political Science; University of California, Santa Barbara, Department of Psychology.

2007—The Rand Organization, Santa Monica, California.

Consulting and Court Testimony

Socio-Environmental Studies Laboratory, National Institutes of Health, Washington, D.C.

National Oceanic and Atmospheric Administration, Washington, D.C.

Environmental Protection Agency, Washington, D.C.

National Aeronautics and Space Administration (Robert Dodd and Associates/The Battelle Memorial Institute), Mountain View, California.

Center for Survey Methods Research, U.S. Bureau of the Census, Washington, D.C.

Office of Survey Methods Research, U.S. Bureau of Labor Statistics, Washington, D.C.

Leadership Analysis Group, U.S. Central Intelligence Agency, McLean, Virginia.

United States Government Accountability Office, Washington, DC.

Centers for Disease Control and Prevention, Atlanta, Georgia.

National Cancer Institute, Rockville, Maryland.

Center for Human Resource Research, Ohio State University, Columbus, Ohio.

Office of Lake County Prosecuting Attorney, Painesville, Ohio.

The Attorney General of the State of Ohio, Columbus, Ohio.

Centre for Comparative Social Surveys, City University, London, United Kingdom.

Rand Corporation, Santa Monica, California.

Stanford University Alumni Association, Stanford, California.

SRI International, Arlington, Virginia.

The Attorney General of Oklahoma.

Office of Social Research, CBS Inc., New York, New York.

ABC News, New York, New York.

Home Box Office, New York, New York.

Google, Mountain View, California.

Pfizer, Inc., New York, New York.

American Civil Liberties Union of Northern California/Brad Seligman/Howard, Rice, Nemerovski, Canady, Falk, & Rabkin, San Francisco/Berkeley, California.

Beau Townsend Ford Dealership, Dayton, Ohio.

United States Trotting Association, Columbus, Ohio.

Berlex Laboratories, Inc., Wayne, New Jersey.

YouGov, London, United Kingdom.

MJ Research, Waltham, Massachusetts.

Empire Blue Cross/Blue Shield, New York, New York.

Momentum Market Intelligence, Portland, Oregon.

Central Market Research and Insights, Microsoft, Redmond, Washington.

The Urban Institute, Washington, D.C.

Industrial Economics, Cambridge, Massachusetts.

Healthcare Research Systems, Columbus, Ohio.

Survey Research Center, University of Maryland, College Park, Maryland.

Center for Human Resource Research, Columbus, Ohio.

Washington State University, Pullman, Washington.

Turner Research, Jacksonville, Florida.

NuStats, Austin, Texas.

Kaiser Family Foundation, Menlo Park, California.

Achievement Associates, Darnestown, Maryland.

The Saguaro Seminar: Civic Engagement in America, Harvard University, Cambridge, Massachusetts.

Donald McTigue, Esq., Columbus, Ohio.

Thompson Coburn LLP, St. Louis, Missouri.

Shook, Hardy, & Bacon LLP, Kansas City, Missouri.

Arnold and Porter LLP, New York, New York.
Bradley W. Hertz, Esq., Los Angeles, California.
Larson King LLP, Minneapolis, Minnesota.
Paul, Hastings, Janofsky, and Walker, LLP, San Francisco, California.
Carr, Korein, Tillery, LLP, Chicago, Illinois.
Milberg, Weiss, Bershad, Hynes, and Lerach, LLP, New York, New York.
Bourgault & Harding, Las Vegas, Nevada.
Aikin Gump Strauss Hauer & Feld, LLP, Washington, DC.
McManemin and Smith, PC, Dallas, Texas.
Zimmerman Reed, PLLP, Minneapolis, Minnesota.
Spolin Silverman, Cohen, and Bertlett LLP, Santa Monica, California.
Righetti Wynne P.C., San Francisco, California.
Blackwell Sanders Peper Martin LLP, Kansas City, Missouri.
Davis Wright Tremaine LLP, Seattle, Washington.
Storch Amini & Munves, P.C., New York, New York.
Twomey Law Office, Epsom, New Hampshire.
Righetti Law Firm, P.C., San Francisco, California.
Dostart Clapp Gordon & Coveney LLP, San Diego, California.
Wynne Law Firm, Greenbrae, California.
Lorens and Associates, San Diego, California.
Arias, Ozzello & Gignac, LLP, Los Angeles, California.
Keller Grover, LLP, San Francisco, California.
Law Offices of Kevin T. Barnes, Los Angeles, California.
Cohelan & Khoury, San Diego, California.
Law Offices of Joseph Antonelli, West Covina, California.

Short Courses on Questionnaire Design

Internal Revenue Service, Washington, DC.
United States General Accounting Office, Washington, DC.
Office of Management and Budget, The White House, Washington, DC.
United States Government Accountability Office, Washington, DC.
Science Resources Statistics Program, National Science Foundation, Washington, DC.
National Opinion Research Center, Chicago, Illinois.
Survey Research Laboratory, University of Illinois at Chicago, Chicago, Illinois.
Center for AIDS Prevention Studies, Department of Epidemiology and Biostatistics, University of California, San Francisco, California.
Monitor Company, Cambridge, Massachusetts.
American Association for Public Opinion Research Annual Meeting, St. Louis, Missouri.
American Association for Public Opinion Research Annual Meeting, Portland, Oregon.
American Association for Public Opinion Research Annual Meeting, Miami, Florida.
New York Chapter of the American Association for Public Opinion Research, New York, New York.
Office for National Statistics, London, United Kingdom.
Market Strategies, Southfield, Michigan.
Total Research Corporation, Princeton, New Jersey.
Pfizer, Inc., New York, New York.
Worldwide Market Intelligence Conference, IBM, Rye, New York.
American Society of Trial Consultants Annual Meeting, Williamsburg, Virginia.
American Society of Trial Consultants Annual Meeting, Westminster, Colorado.
American Society of Trial Consultants Annual Meeting, Memphis, Tennessee.
American Marketing Association Advanced Research Techniques Forum, Vail, Colorado.
Satisfaction Research Division, IBM, White Plains, New York.

American Marketing Association Marketing Effectiveness Online Seminar Series.

Faculty of Education, University of Johannesburg, Johannesburg, South Africa.

Odom Institute, University of North Carolina, Chapel Hill, North Carolina.

Google, Mountain View, California.

Eric M. Mindich Encounters with Authors, Harvard University, Cambridge, Massachusetts.

RTI International, Research Triangle Park, North Carolina.

BC Stats, Province of British Columbia Ministry of Labour and Citizens' Services, Victoria, British Columbia, Canada.

Alphadetail, San Mateo, California.

Chairman GORDON. Thank you, Doctor, and Captain McVenes, you are recognized.

STATEMENT OF CAPTAIN TERRY L. MCVENES, EXECUTIVE AIR SAFETY CHAIRMAN, AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

Captain MCVENES. Mr. Chairman, Mr. Hall, Members of the Committee, good afternoon, and thank you for the opportunity to outline the Air Line Pilots Association's views on aviation safety and the role that we play in protecting the traveling public.

ALPA is the world's largest pilot union. We represent more than 60,000 pilots at 42 airlines in the United States and Canada. ALPA was founded in 1931, and for more than 76 years now ALPA has had a tremendous impact on improving aviation safety. Today ALPA continues to be the world's leading aviation safety advocate, protecting the safety interests of our passengers, our fellow crew members, and cargo around the world.

Over the past 10 years the U.S. aviation industry has seen a 65 percent decrease in the accident rate, and as a result, the U.S. safety record is the envy of the rest of the world. Much of our success is due to the collaborative approach that has taken place among airline managements, labor, and the FAA in voluntary collection and analysis of de-identified safety-related data. By analyzing recorded data that is obtained during routine flight operations and receiving written reports from the front-line employees in a confidential and non-punitive environment, we can not only see what is happening out there but also why it is happening.

Today these stand-alone programs at individual airlines are reaching their maturity, and that is a reflection of the dynamic nature of any data collection effort. It has to adapt to changes in the environment, and in this case, the changes in the aviation industry.

As safety professionals continue to see value in these programs and work with them in more detail, it has become clear that even more can be learned by sharing safety information among various stakeholders in the industry. The FAA and the airline industry, including ALPA, continue to work together on developing a formalized process in which safety information can be accessed through secure networks under mutually-agreeable rules of engagement.

ALPA has been working closely with the FAA, NASA, and the airlines to develop a process that will make the safety information available to decision-makers to help them in their efforts to manage risks. This process is also invaluable in the sharing of accident and incident prevention strategies across the entire industry.

Again, though, I would point out that as time goes on, the industry continues to refine our processes for maximizing the safety benefits that the traveling public receives from collecting data while at the same time protecting those employees and the airlines that bring the data to the table in the first place.

NASA, especially through the Aviation Safety Reporting System or ASRS, has always been an important player in aviation safety. Its human factors research in particular has provided great value to our industry. The NAOMS survey was part of the early effort to provide more information to help all of us improve aviation safety. And this first survey was a test of the process and methodology, and we understand that the data extracted from this survey were summarized, and those summaries were shared with government and industry.

But as in any first test the data didn't correlate very well with data from other sources, possibly due to the mix of general aviation and airline operations. The aviation community had plans to further analyze those discrepancies and determine if the data was reliable, but the funding for NAOMS ran out, and that is when ALPA stepped in to help keep that project alive as part of our involvement with the Commercial Aviation Safety Team or CAST. And while we have been working with CAST to modify that survey, we did not receive any collected data from NASA.

So what should we do with the data now? Well, there are several solutions that are available. We have heard some of them this afternoon. The one that makes a lot of sense is to provide NASA with the necessary resources so it can complete its peer review of the data, then analyze that data, while at the same time maintain the confidentiality and protective provisions that apply to voluntarily supplied safety information.

Other solutions may also exist, but regardless of the solution, it is important to keep in mind that raw data distributed without appropriate analysis and scrutiny to ensure its validity can lead to unintended consequences. Incomplete or inaccurate conclusions can be reached if the collection method is flawed or if people looking at the data aren't familiar with aviation or the context of how that information was provided.

No one knows and understands the data better than the stakeholders that provided the data in the first place. That is why it is so important that those stakeholders work closely with the analysts of the data, and this will ensure accurate and meaningful conclusions can be reached. Just as importantly, if raw data is simply dumped onto the general public without the quality controls I have mentioned, it would undermine the confidence that pilots and the airline community that had voluntarily and confidentially supplied data and other sources. We have to make sure that that confidentiality remains secure.

Now, as an airline captain, one who represents the safety interests of 60,000 other airline pilots, I am concerned that this could very well erode the very programs that have driven the excellent safety record of airline travel that the public has come to rely on.

Thank you, and again, for the opportunity to testify today, and I will be pleased to address any questions you may have.

[The prepared statement of Captain McVenes follows:]

PREPARED STATEMENT OF CAPTAIN TERRY L. MCVENES

Good afternoon and thank you for the opportunity to outline the Air Line Pilots Association's views on aviation safety and the role we play in protecting the traveling public. ALPA is the world's largest pilot union, representing more than 60,000 pilots who fly for 42 airlines in the U.S. and Canada. ALPA was founded in 1931, and for more than 76 years, ALPA has had a tremendous impact on improving aviation safety. Today, ALPA continues to be the world's leading aviation safety advocate, protecting the safety interests of our passengers, fellow crew members, and cargo around the world.

Over the past 10 years, the U.S. aviation industry has seen a 65 percent decrease in the accident rate, and as a result, the U.S. safety record is the envy of the rest of the world. Much of our success is due to the collaborative approach that has taken place among airline managements, labor, and the FAA in the voluntary collection and analysis of de-identified safety related data. By analyzing recorded data obtained during routine flight operations and receiving written reports from the front line employees in a confidential and non-punitive environment, we can not only see what is happening, but also why it is happening. Today, these stand-alone safety programs at individual airlines are reaching their maturity. That is a reflection of the dynamic nature of any data collection effort—it must adapt to changes in the environment; in this case, the changes in the aviation industry.

As safety professionals continue to see value in these programs and work with them in more detail, it has become clear that even more can be learned by sharing safety information among the various stakeholders in the industry. The FAA and the airline industry, including ALPA, continue to work together on developing a formalized process in which safety information can be accessed through secure networks under mutually agreeable rules of engagement. ALPA has been working closely with the FAA, NASA, and the airlines to develop a process that will make this safety information available to decision-makers to help them in their efforts to manage risk. This process is also invaluable in the sharing of accident- and incident-prevention strategies across the industry. Again, though, I would point out that as time goes on, the industry continues to refine our processes for maximizing the safety benefits that the traveling public receives from collecting data while at the same time protecting those employees and airlines that bring the data to the table.

NASA, especially through the Aviation Safety Reporting System (ASRS) program, has always been an important player in aviation safety. Its human factors research, in particular, has provided great value to our industry. The National Aviation Operations Monitoring Service (NAOMS) survey was part of the early effort to provide more information to help all of us improve aviation safety. This first survey was a test of the process and methodology. We understand that the data extracted from this survey were summarized and those summaries were shared with the government and industry. As in any first test, the data didn't correlate very well with data from other sources, possibly due to the mix of general aviation and airline operations. The aviation community had plans to further analyze those discrepancies and determine if the data were reliable, but funding for NAOMS ran out. That is when ALPA stepped in to help keep the project alive as a part of our involvement with the Commercial Aviation Safety Team (CAST). While we have been working with CAST to modify the survey, we did not receive any of the collected data from NASA.

What should happen to the data now? Several solutions are available. One that makes a lot of sense is to provide NASA with the necessary resources so that it can complete a peer review of the data and then analyze the data, while at the same time maintain the confidentiality and protective provisions that apply to voluntarily supplied safety information. Other solutions may also exist.

Regardless of the solution, it is important to keep in mind that raw data, distributed without appropriate analysis and scrutiny to ensure its validity, can lead to unintended consequences. Incomplete or inaccurate conclusions can be reached if the collection method is flawed or if people looking at the data aren't familiar with aviation or the context of how that information was provided. No one knows and understands the data better than the stakeholders that provide the data in the first place. That is why it is so important that those stakeholders work closely with the analysts of the data. This will ensure accurate and meaningful conclusions can be reached.

Just as importantly, if raw data are simply distributed to the general public without the quality controls I've mentioned, it would undermine the confidence that pilots and the airline community have that voluntarily and confidentially supplied safety data will remain secure. As an airline captain, and one who represents the safety interests of 60,000 other airline pilots, I'm concerned that this could very well erode the very programs that have driven the excellent safety record of airline travel that the public has come to rely on.

Thank you, again for the opportunity to testify today. I will be pleased to address any questions that you may have.

BIOGRAPHY FOR TERRY L. MCVENES

Capt. Terry McVenes serves as the Executive Air Safety Chairman for the Air Line Pilots Association, International, representing ALPA pilots in airline safety and engineering matters arising within the industry. His responsibilities include oversight of more than 600 safety representatives from 42 airlines in the United States and Canada, as well as budgetary and management supervision of more than 200 projects within the ALPA safety structure.

Capt. McVenes chairs the Steering and Oversight Committee for the ALPA International safety structure and is a former member of the Operations Committee and MMEL Working Group. He represents ALPA pilots on the FAA's Voluntary Aviation Safety Information Sharing Aviation Rule-making Committee and serves as its co-chairman. He has spoken at many international forums on a wide variety of aviation safety topics. He has also authored numerous articles on aviation safety, which have appeared in national and international publications.

Prior to his current appointment, Capt. McVenes served as Executive Air Safety Vice Chairman, Chairman of the Central Air Safety Committee for U.S. Airways, and Chairman of the Aircraft Evaluation Committee. He coordinated the establishment of the Aviation Safety Action Program (ASAP) at U.S. Airways and served as a member of the FOQA Monitoring Team. He has participated in numerous accident and incident investigations and was a member of several line safety audit teams. Capt. McVenes also served as a member of the Airbus Integration Team and the Fuel Awareness and Conservation Team.

Capt. McVenes began his airline career in 1978 with Rocky Mountain Airways in Denver, Colo., flying the DHC–6 (Twin Otter) and DHC–7 (Dash 7) aircraft. In March 1985, he was hired by Pacific Southwest Airlines (PSA), which later merged into US Airways. He is rated on the DHC–7, BAe–146, FK–28, DC–9, MD–80, A–320, and B–737. He currently is a captain on the A320 for U.S. Airways and has more than 17,000 hours of flying time.

Prior to his airline career, Capt. McVenes was employed as an engineer for the Boeing Company in Seattle, Wash. He holds a Bachelor of Science degree in aerospace engineering from the University of Colorado and the certificate of aviation safety management from the University of Southern California.

DISCUSSION

NAOMS SURVEY AND METHODOLOGY

Chairman GORDON. Thank you, Captain McVenes.

Dr. Krosnick, is it fair to summarize a portion of your testimony by saying that when the methodology and the program was set up, the NAOMS Program, that it was set up in a way that the confidentiality of the material would be protected?

And if that was the case, and I think that, again, NASA certified that when they said that they set it up by saying, we have no means for—anyway—they assured us in their report that that would be the case. So how long should it take them to get that information to us?

Dr. KROSNICK. I would think less than a week to assure that any incidental open-ended responses in the file don't happen to mention an airport or an airline. And the Director mentioned the idea of eliminating fields in the data set. I would think the normal federal procedure would be to redact words rather than entire fields of data.

Chairman GORDON. Well, I would hope that NASA would hear your testimony and that the end of the year is a worst-case scenario and next week is a best-case scenario.

Also, Dr. Krosnick, the purpose of the NAOMS was to go beyond the event driven or so-called action response syndrome to aviation safety and develop a statistical, valid database for safety-related events for decision-makers. It was specifically designed to overcome the shortcomings of the voluntary anecdotal Aviation Safety Reporting System, which couldn't be used to tell anyone how often certain events occurred.

Is that accurate?

Dr. KROSNICK. Yes. That is exactly right. That, the ASRS System relies on pilots to voluntarily choose to fill out a form and mail it in when they feel an event has occurred that merits that. And certainly plenty of forms are filled out and mailed in every year, but because it is voluntary, there is every reason to believe that many events that occur do not get reported through that system.

So the purpose of NAOMS was to assure that with a representative sample of pilots who were interviewed every week of every year, that it would be possible to count up events in many categories that never get described in reports to ASRS.

Chairman GORDON. And was it successful in doing so?

Dr. KROSNICK. Well, we can't quite answer that question, can we? What we know is that we designed—I should say the team designed with my help a superb methodology and implemented it with the approval of OMB, which is a pretty tough critic of survey methods in the Federal Government, and so we can believe in the method, but when the data come back, the next step is to analyze those data fully, write reports, have those reports peer reviewed, and proceed ahead with assessments of validity, which we would have loved to do if the funding hadn't been shut down early.

Chairman GORDON. Well, it seems to me that this was an extraordinary high percentage of return. And you mentioned, what did you, was it 40,000 commercial pilots?

Dr. KROSNICK. Twenty-four thousand commercial pilots interviewed.

Chairman GORDON. Right. I understand that, but how many are there in total?

Dr. KROSNICK. Oh, in the population?

Chairman GORDON. Yes, sir.

Dr. KROSNICK. I will defer to Bob Dodd on that.

Chairman GORDON. Or maybe Captain McVenes. Approximately what number of commercial pilots are there?

Captain MCVENES. There is probably roughly 100,000 commercial pilots.

Dr. KROSNICK. That is the number that we worked with.

Chairman GORDON. So, you know, it is, to me a fourth that responded voluntarily is an incredible number and should be——

Dr. KROSNICK. Well, if you don't mind, let us be careful about that.

Chairman GORDON. Okay.

Dr. KROSNICK. It is actually not 24,000 pilots who were interviewed. It is 24,000 interviews were conducted. So we drew statistical samples of very small numbers of pilots to be interviewed each week.

Chairman GORDON. How many would you say, how many different pilots would have been interviewed?

Dr. KROSNICK. About 8,000 a year.

Chairman GORDON. Which is still an exceptionally large sampling.

Dr. KROSNICK. Yeah. Much bigger than most surveys. Absolutely.

Chairman GORDON. And was it intended to be a continuing permanent database or just a short-term experiment?

Dr. KROSNICK. Well, the slide that I showed earlier that NASA displayed at all the public meetings that we did early on indicated that it was planned to be a permanent monitoring system.

Chairman GORDON. Well, then I hope that we get it up and running. I think it—again, let me, once again state that the United States of America has the safest air transportation system in the world, and I think part of that reason as Mr. Hall said earlier, was because of the transparency, of continuing to try to do things better, better, better, better, and this is just one more effort to raise that extraordinarily high bar or I won't say raise it any higher but keep it there.

I thank you, and Mr. Hall is recognized.

SURVEY METHODOLOGY AND CONFIDENTIALITY

Mr. HALL OF TEXAS. Thank you, Mr. Chairman. Captain McVenes, you said regardless of the solution it is important to keep in mind that raw data distributed without appropriate analysis and scrutiny to ensure its validity can lead to unintended consequences. Actually, sir, we have heard from several researchers that commercial and general aviation pilots were very receptive and even were very eager to share their experiences and views with NASA researchers in part because they were told that they would be anonymous and would be protected.

So how confident are you that releasing the data with confidential information removed as described by Administrator Griffin will not hinder pilots from participating in future surveys?

Captain MCVENES. Well, the confidentiality piece is so very important.

Mr. HALL OF TEXAS. Very important.

Captain MCVENES. Because it is what makes that transparency happen. It makes people want to report knowing that that information is going to be used pro-actively in a safety-related type of activity as opposed to some other activity of any sort of sensationalism or whatever it may be. So that is why it is very important to keep that flow of information coming, and the reason that we have been successful as an industry to get a lot of voluntary participation in these programs, whether it is the NAOMS survey or the individual programs that are going on at our airlines, is because that information is used pro-actively. It is not used in a punitive type of environment. It is used for safety purposes. And that is why that is so important.

Mr. HALL OF TEXAS. And Dr. Dodd, you and Dr. Krosnick were shaking your head indicating that you agree with his——

Dr. DODD. That is correct.

Dr. KROSNICK. Yeah. I think it is very important that respondent confidentiality——

Mr. HALL OF TEXAS. Yeah. It certainly makes sense.

Dr. KROSNICK.—never be compromised.

Mr. HALL OF TEXAS. Sure.

Dr. KROSNICK. And the good news is for everyone here that the survey data were collected in a way so that no one could identify the pilots. In other words, the data are in electronic files that do not have the identities of the pilots in them. And so there are 24,000 rows of numbers indicating the answers that they gave to statistical questions but not in any way indicating their name, phone number, or identity in any other way.

So that is the good news.

Mr. HALL OF TEXAS. And I think the Chairman in his inquiry to you asked you in your testimony you state that NAOMS was always envisioned to continue operating, and whether or not this was planned to be continued at NASA or at another government agency like the FAA. How was it? Who did finish it that last year?

Dr. KROSNICK. Well, in the—all of the work on NAOMS to date has been done by NASA, and so my understanding is that there was a planned attempt at a hand-off of the methodology to ALPA. The plan as you have heard already from the Chairman was to switch from telephone interviewing, which we had determined to be the most reliable way to make these measurements, over to Internet data collection, where respondents could go to a website and answer questionnaires there.

Unfortunately, a test of that methodology was carried out by NASA, and as I understand it was unfortunately quite a failure, that hardly any pilots participated in the Internet version of the survey. And I am not surprised by that, because our research methods literature suggests that respondents of this sort are far more likely to participate if the telephone call method is used.

So my personal concern at the moment is the only plans I have heard for ALPA possibly to pick up this project are with this methodology which has already shown to be not feasible. But more importantly I guess I share perhaps the implication of what you are suggesting, and that is that I don't know that this is an operation that can work effectively outside of government. And I think it is particularly important to recognize, as I said in my comments, that NASA is really trusted by pilots, as I am sure Capt. McVenes will acknowledge, because the ASRS has been so successful in collecting very detailed information that is made public and that reveals a lot about the details of bad things that go on. We heard earlier a transcript of a pilot talking about falling asleep in the cockpit. That is a pretty scary story, and that is on the Internet for anyone to read.

And so, you know, the possibility that that information being revealed to the public and its benefits seems clearly to outweigh the possibility that someone could get in trouble because NASA has successfully protected people from that. And I believe NASA has the trust and credibility with pilots to continue to do that.

WHY DIDN'T THE FAA CONTINUE THE PROJECT?

Mr. HALL OF TEXAS. Doctor, thank you. I will ask any of the three of you, do you all know why FAA didn't pick up the project? Why didn't they pick the project up?

Dr. DODD. Well, I don't think we originally planned for FAA to pick up the project, and what Dr. Krosnick was addressing is key to that issue, and that is NASA has a reputation among the pilot community of protecting their identity.

The Aviation Safety Reporting System, which you have heard referenced a number of times today, is a program that has been in existence for 30 years. During that time not one pilot's confidentiality has been compromised. There has never been any reverse engineering where somebody has gone into the report and been able to identify who the reporter was, and because of that NASA was chosen to be the primary and best government agency to do this work because of that reputation.

The FAA's mission is slightly different, and of course, the FAA is responsible for enforcement and certification of pilots. And because of that, pilots may be unwilling to voluntarily report issues that might result in them getting a slap on the hand, if you will, or what we call a certificate of action.

So historically surveys run by the FAA among the pilot community don't have a very high response rate, which is one of the metrics that we use to evaluate how well we are doing with the survey.

As an aside, with this particular survey that NAOMS, that NASA did with NAOMS, we had an 85 percent acceptance rate among the pilots contacted who agreed to do the survey. That is an exceptionally high response rate and gives us confidence that the pilots were willing to meaningfully engage in the process.

Mr. HALL OF TEXAS. Thank you. My time really has expired. I yield back any time I have or don't have.

Chairman GORDON. Not much, Mr. Hall.

The Space and Aeronautics Subcommittee Chairman, Mr. Udall, is represented or recognized.

BEST ORGANIZATION TO OPERATE NAOMS

Mr. UDALL. Thank you, Mr. Chairman. Again, I want to thank the panel for your compelling and insightful testimony.

Dr. Dodd, if I could focus on part of your testimony to start with, you stated, I want to get this right. I believe that NAOMS should be reinstituted and operated by an independent and unbiased organization. Should NAOMS be operated by NASA, some other organization? What would you recommend?

Dr. DODD. I think there is a number of suitable organizations, and it would depend on a number of issues. I think Dr. Krosnick's observation that this is inherently a government type of activity is absolutely correct. So I would not hazard to recommend what agencies might be appropriate. I think NASA at the working staff level did an outstanding job with this project, and they have the technical expertise to do that. So I certainly would have no objections from NASA continuing to do this work.

So certainly that would be one agency that fits my definition.

Mr. UDALL. Do the other panelists care to comment on that question?

Dr. KROSNICK. Yeah. I agree, of course, that NASA is suitable as I have suggested already in my comments, and from the extensive learning I have benefited from about the airline operation and industry, it is hard for me to identify another organization from my many hours talking with pilots that the practitioners would have the same confidence in. To some degree there is specialization in these federal agencies, and the FAA is particularly good at collecting large electronic databases from machines.

NASA's specialty in this area has been activities like ASRS where humans are reporting their experiences. So to some degree NAOMS fits very nicely under the NASA umbrella. And I agree with Dr. Dodd that NASA has done a wonderful job with this project and has earned the recognition that they deserve, I think, by that quality of work, and why not let them continue.

Captain MCVENES. And certainly from our perspective, you know, having NASA continue with the project is— we certainly wouldn't object to. Our role in the whole thing was to keep it alive in whatever way we could. And to Mr. Hall's point as, you know, why FAA didn't take it over directly, kind of indirectly they were involved with it in the fact that their work with the commercial aviation safety team, as well as the rest of the industry, we were trying to utilize that group as a way to keep this thing going and involve all the stakeholders including the FAA on this.

TERMINATION OF PROGRAM

Mr. UDALL. If I might return to you, Captain for a second, final question, editorialize briefly, and my colleague, Congressman Lipinski asked a question in the earlier round, the first panel, what, why did NASA stop? What was underway here, and it is curious, but sitting that aside, I want to thank you, Captain, for your willingness to testify on such short notice in front of the Committee.

Captain MCVENES. My pleasure.

Mr. UDALL. And I was struck by one of your statements which read, NASA has always been an important player in aviation safety. It is human factors, research in particular, that provide a great value to our industry. At some committee hearings that I have chaired earlier this year we have heard numerous concerns raised about the cutbacks and the NASA human factors R&D programs in recent years, particularly in the applied areas.

Have you heard these same concerns raised, and do you share them, and after the Captain is finished, if the other two panelists would care to comment, I would sure appreciate it.

Captain MCVENES. Yeah. We were concerned. I know we wrote several letters from our president to the various groups here in Washington to try to change the mind of those that controlled the purse strings over that, because we saw a great value in human factors research that was going on, especially as it applied to some of the automation, changes that were taking place in our aircraft, and so that is why we were very interested in trying to keep that alive as best we could.

This is an important part of aviation, especially the future of aviation as we continue to evolve with new technologies, we understand what that human element is in the role of how we fly our airplanes. And NASA played a very big role in that in the past, and unfortunately, they are not doing it as much anymore as they—we feel they should be.

Dr. KROSNICK. I agree, and if you look at the slide that is still up on the screen, you will see that was an ambitious work plan for a great deal of research to be carried out over a long period of time, and the budget that was established for that work in the beginning was appropriately generous to cover the cost at an A-plus quality level.

But that budget shrank regularly during the years and contracted for reasons we were not informed about, such that in the end there was not money available to pay for most of the work to be done. And it was that sort of choking off of the project that accounts for the incompletion of the work.

And I think, you know, you are perhaps pointing to a larger issue at NASA about changing priorities and changing budgets in a way that Bob is actually even more informed about than I am.

Dr. DODD. The only additional——

Mr. UDALL. Mr. Chairman, if I might use of Mr. Hall's remaining time for Dr. Dodd to comment.

Dr. DODD. Very quickly. The NASA human factors program, we saw it while we were involved with the NAOMS Project of year by year having funding removed from the program, and we saw it, and at the local level and saw that pain that it caused among the staff at NASA Ames.

The other thing I want to point out is that aviation is an incredibly labor-intensive activity. I won't go through all the activities that are involved with it, but human factors is key. It is usually human error that is associated with most of our major problems, and we need to continue to fund that research and that focus on that because it is not going to go away.

Mr. UDALL. Thank you. Thank you, Mr. Chairman.

Chairman GORDON. Sir, your time has expired, and now the Vice Chairman of the Science and Technology Committee, Mr. Lipinski, is recognized for five minutes.

Mr. LIPINSKI. Thank you, Chairman Gordon. I want to thank all of our witnesses for their testimony today, especially Captain McVenes. As Mr. Udall said, I know you did this on short notice. We appreciate that.

Dr. Krosnick, I am not sure if you remember 14 years ago, I think it was, I did the summer program, political psychology, at Ohio State University.

Dr. KROSNICK. That is why you look familiar. There we go.

Mr. LIPINSKI. And so I have known you for, going back many years there, and I certainly have a great deal of respect for your work.

I wanted to sort of keep going down the line of what I started on earlier with the first panel. I asked them to put the timeline up there. I ask you, Dr. Krosnick, because I think I—actually I heard this earlier. I was in my office listening to the testimony, and when I heard this, I decided I had to come and run back here to ask some questions.

Where did the process stop in this timeline?

Dr. KROSNICK. I think Dr. Dodd is the best person to describe it.

Mr. LIPINSKI. Okay.

Dr. DODD. We basically—2003, is when we really had the plug pulled on us. We—one of the things I should clarify is that NASA had a five-year program from a budgeting point of view for this project and many others, and so when you hear NASA saying that there was an end point for this particular project, it was because of a five-year budgeting exercise and that the project was not continued outside of that budget for the next cycle.

It stopped in 2003, essentially, as far as continuing development. In 2002, we were getting ready for air traffic controllers. We did three focus groups with 15 air traffic controllers each, and we had about a year and a half development cycle planned for the development of the air traffic controller questionnaire. We briefed NASA. They were very receptive to the idea, and at that point is when we stopped ADC development, and it was because of the funding issues clearly were going to be cut back at that point. And so we dropped that out of the plan at that point. We didn't have the money for the development. We focused on continuing the pilot survey.

Mr. LIPINSKI. That is even more information than I was aware of, but it fits perfectly into my question, and none of you, I believe, can answer this but I have questions that I asked Dr. Griffin, and I think he was mistaken about there not being—the program not being interrupted at a certain point, that it had, you know, gone its full course.

Certainly there have been issues involving air traffic controllers and the FAA. That is a major issue, something that we have been dealing with, trying to get dealt with in the Transportation Committee. It is a big labor issue, and it seems to me that what Dr. Dodd just said seems to fit with possibly when it was time to actually go and do the survey of the air traffic controllers, that is where this stopped.

And so I really would like to, Mr. Chairman, I think that is an important point to look at because what it comes down to is safety is the most important thing, and the whole purpose of this was for safety. It is $11 million, it is six years that was spent on it, but what can we do to improve safety.

I am not going to say the sky is falling literally, but as you said, Mr. Chairman, it is just trying to make a safe system even safer, and I just want to leave out there the, you know, I don't know if anyone—if Dr. Dodd or anyone else has any other comments on that, but the possibility of there got to be a place where the FAA perhaps did not want to go with the survey of the air traffic controllers at that time, and that is where this stopped.

Now, if anyone wants to add anything to that or we would just leave it there. So any witnesses want to add anything to that?

Dr. KROSNICK. I really can't comment because I didn't know what the FAA decision-making was on that or senior NASA management as far as funding decisions. I am sure that there were probably other issues as part of that process, and other than that I can't comment.

Mr. LIPINSKI. Thank you. I will leave it at that, Mr. Chairman.

Chairman GORDON. Thank you, Mr. Lipinski, and my thanks to our witnesses today for their time and expertise and Dr. Krosnick, I hope you will make yourself available and your expertise to NASA if they need you to help do this final, you know, cleaning if there is any need to be of this list.

And if there is no objection, the record will remain open for additional statements from the Members and for answers to any follow-up questions the Committee may ask of the witnesses.

Without objection, so ordered.

[Whereupon, at 4:05 p.m., the Committee was adjourned.]

Appendix 1:

ANSWERS TO POST-HEARING QUESTIONS

Answers to Post-Hearing Questions

Responses by Michael D. Griffin, Administrator, National Aeronautics and Space Administration (NASA)

Questions submitted by Chairman Bart Gordon

Q1. Please provide a full discussion of the transfer of the NAOMS methodology to the Air Line Pilots Association (ALPA), including revisions in the questionnaire, ALPA's contribution to the cost of the transfer and revisions, and whether any peer review was conducted on either the original survey methodology or the revised methodology as transferred to ALPA. If the NAOMS methodology was not peer-reviewed, please describe what process was used to validate the methodology prior to transfer to ALPA.

A1. **Transfer of the NAOMS Methodology to ALPA**

The NAOMS team adapted the computer-assisted, telephone interview process (original survey methodology) to a web-based, data collection mode (revised survey methodology) using commercial, off-the-shelf (COTS) software (ILLUME by DatStat Inc.). NASA conducted testing during the months of February and March 2006 to compare the web-based survey process with the original computer-assisted telephone survey process.

The NAOMS team purchased a one-year license starting in December 2006 from DatStat to apply ILLUME technology to a web-based survey that replicated the functionality of the original computer-assisted telephone survey. NASA transferred this license to ALPA in January 2007.

The NAOMS team provided training sessions for the ALPA team on the NAOMS web-based survey methodology.

NASA has asked the National Academy of Sciences to assess the NAOMS survey methodology, and to the extent possible, to assess the potential utility of the survey responses.

Revisions in the Questionnaire

There were revisions to the content of the questionnaire associated with adaptation for web-based surveys. Modifications were made to the computer-assisted telephone interface model to adapt the questions so they would capture the same data via the web-based interface model. In addition, some questions were modified to simplify the telephone survey questions for the web-based survey application.

ALPA's Contribution to the Cost of the Transfer

ALPA is estimated to have contributed approximately one work-year equivalent to support the transfer of the web-based survey methodology.

Peer-Review of the NAOMS Methodology

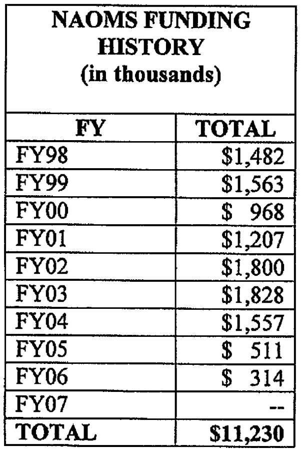
From 1998 to 2004, the NAOMS project team gave approximately 17 PowerPoint briefings to various audiences, mainly government and industry personnel. (These briefings have been provided to the House Committee on Science and Technology at their request.) However, none of the research conducted in the NAOMS project has been peer-reviewed to date. PowerPoint briefings to stakeholders, while having some value, do not constitute peer review. Accordingly, no product of the NAOMS project, including the survey methodology, the survey data, and any analysis of those data, should be viewed or considered at this stage as having been validated.

It should be noted that NASA's assertion that none of results from the NAOMS project can be considered validated does not mean that NASA is drawing conclusions about the validity of the survey data; we are simply stating that no such conclusions can be credibly drawn. That said, comparisons of some of the results reported in the briefings prepared by the NAOMS project team to event rates that are known with reasonable certainty, such as engine failures, have led NASA to conclude that there is reason to question the results presented by the NAOMS project team in their various briefings.

In order to rectify this situation as best as possible, NASA has asked the National Academy of Sciences to assess the NAOMS survey methodology, and to the extent possible, to assess the potential utility of the survey responses.

Q2. Please provide a breakout by fiscal year by recipient of the $11.3 million you stated in your testimony was spent on the NAOMS project.

A2. Battelle was the prime contractor for the NAOMS project; $11.23 million is the total full cost of the project. The costs break out by fiscal year as follows:



NAOMS FUNDING HISTORY (in thousands)

FY	TOTAL
FY98	$1,482
FY99	$1,563
FY00	$ 968
FY01	$1,207
FY02	$1,800
FY03	$1,828
FY04	$1,557
FY05	$ 511
FY06	$ 314
FY07	--
TOTAL	**$11,230**

Question submitted by Representative Daniel Lipinski

Q1. I have major concerns that it is going to be difficult to make improvements in the aviation industry if the agencies cannot work collaboratively and trust each other's work. Dr. Griffin, could you comment on your working relationship with the FAA?

A1. A solid collaborative working relationship between NASA and the Federal Aviation Administration (FAA) is critical to the successful outcome of the Nation's vision for the Next Generation Air Transportation System (NextGen). The working relationship between NASA and the FAA has traditionally been solid and continues to strengthen at all levels. As part of the Joint Planning and Development Office (JPDO), a multi-agency organization focused on developing the NextGen, the FAA and NASA have formed a strong partnership with a common goal of a greatly improved future air transportation system for the Nation. Both the NASA and FAA Administrators are members of a Senior Policy Committee (SPC) that oversees the work of the JPDO. Among its key activities, the Committee works to provide policy guidance, resolve major policy issues, and identify and align resource needs. The partnership to bring about NextGen encompasses not only safety research but also air traffic management and environmental research. Participation of both Administrators on the SPC demonstrates at the highest level within each agency a relationship that is committed to a future aviation system that is responsive to the mobility needs of the public.

To further ensure that a strong working relationship between NASA and FAA is promoted at all levels, Dr. Lisa Porter, the NASA Associate Administrator for Aeronautics, meets regularly with senior management of the FAA to have open and frank discussions on matters the two agencies are jointly working. For example, during FY 2007, Dr. Porter and Mr. Nicholas Sabatini, the FAA Associate Administrator for Aviation Safety, held joint meetings to monitor the progress of technologies that were being developed by NASA and implemented by the FAA into what has become the Aviation Safety Information and Analysis Sharing (ASIAS) system. At the beginning of FY 2008, the ASIAS system successfully transitioned from NASA to the FAA and the aviation industry as a means to share a wide variety of safety data pertaining to the national air transportation system. Going forward, NASA continues to develop advanced methods and algorithms for analyzing multiple and varied sources of safety data in order to enable the ability to discover safety precursors before accidents occur. In addition, NASA will continue to work collaboratively with the FAA and industry to transition these new methods into the evolving NextGen.

With regard to air traffic management research, NASA Aeronautics, the FAA Air Traffic Organization (ATO), and the JPDO are working collaboratively to establish a process to transfer technologies from fundamental research and development (R&D) into implementation for the NextGen. This process, which ensures research is sufficient and appropriate to enable NextGen, has top-level commitment from Dr. Porter and Ms. Victoria Cox, Vice President for Operations Planning Services, ATO. A coordinating committee that includes both FAA and NASA representatives oversees four research transition teams that are organized around the NextGen Concept of Operations framework. This framework connects the FAA's Operational Evolution Partnership elements with the NASA research. Teams are collaboratively working to plan near-term R&D transition in areas such as surface management and long-term transition in areas such as dynamic airspace allocation.

As NextGen evolves to handle the projected growth in the national air transportation system, environmental concerns, including the expected increase in noise and air pollution from a variety of emissions, pose a significant hurdle that must be overcome. The future aircraft fleet will need to include technology advancements that enable the growth in the air transportation system without additional impact on the environment. NASA and the FAA have a long history of collaborative work in this area. A variety of predictive tools developed at NASA have been incorporated into the FAA Environmental Management System and used to inform regulatory decisions. In addition, over the last year, the FAA and NASA have worked together on the development of the Goals and Objectives for the Energy & Environment portion of the National Plan for Aeronautics R&D. Both agencies continue to work closely to ensure that fundamental technology developed at NASA can be transitioned to the future fleet.

Finally, NASA and the FAA actively participate in each other's advisory/review committees with representatives of each agency engaging, in an advisory role, in determining the strategic directions of the research of the other. For example, Dr. Porter serves on the FAA's Research and Development Advisory Committee (REDAC) which reviews and then advises the FAA senior management on the relevance and progress of their research and development activities. Further strengthening this collaboration across multiple technical areas and management levels, representatives from each of the three NASA Research Programs in Aeronautics serve as members on subcommittees to the FAA REDAC. In a similar fashion, and at the request of NASA, the FAA has provided representatives to participate on NASA review panels to assess the technical quality, performance, and relevance of NASA research programs. For two of the NASA programs, the designated leads of the review panels were FAA representatives. In addition, NASA researchers serve on various technical committees, such as the Radio Technical Commission for Aeronautics (RTCA) special committees that provide advice to the FAA on technical matters. NASA also makes use of FAA subject matter experts to help evaluate proposals received from universities and industry via the NASA Research Announcement process. These examples of interagency participation on advisory committees, and other joint activities across all levels, demonstrate a working relationship based on trust and respect for the talent and integrity between NASA and the FAA, particularly at the senior leadership level. Continued commitment to such a partnership is critical to the future success of NextGen.

Questions submitted by Representative Russ Carnahan

Q1. Dr. Griffin, news reports have indicated that NASA Associate Administrator, Thomas S. Luedtke, said that revealing the findings could damage the public's confidence in airlines and affect airline profits. Do you believe that it is more important to keep the American people in the dark about the basic reality of where we are in terms of airline safety than to paint an honest portrait for our constituents?

A1. The Associated Press (AP) requested the survey results from this project through the *Freedom of Information Act* (FOIA). NASA made a determination not to release the survey results, using an exemption available under the FOIA. I stated earlier, both to the public and in Congressional testimony, that I do not agree with the way the FOIA exemption was explained and regret any impression that NASA was in any way putting commercial interests ahead of public safety. That was not, and never will be, the case.

Q2. In Mr. Luedtke's final denial letter to the AP regarding its request for the survey results, he wrote that "release of the requested data, which are sensitive and safety-related, could materially affect the public confidence in, and the commercial welfare of, the air carriers and general aviation companies whose pilots participated in the survey . . ." This seems to indicate that the results portrayed *a fairly dire assessment of air safety travel—was Mr. Luedtke going to worst case scenario or is this a legitimate doomsday scenario?*

A2. Mr. Luedtke's determination to not release the survey results was neither. The determination had nothing to do with survey results, as no final report or conclusions had been made. Rather, Mr. Luedtke's letter articulated NASA's determination that the raw survey responses contained information protected by the *Freedom of Information Act* (FOIA) Exemption 4, which incorporates *Trade Secrets Act* protection for confidential commercial information. This exemption requires the protection of confidential commercial information that is voluntarily provided to the Agency and would not customarily be released to the public. Confidential commercial information is defined very broadly and includes company information: 1) relating to its business, including processes, operations and statistical data; 2) which is obtained from someone outside the government; and, 3) which is not generally released to the public.

In response to the FOIA request from the AP, NASA cited concerns for "public confidence" and for the "commercial welfare" of air carriers as the supporting basis for the exemption cited in denying the request for the data. This sentence, though taken from case law, was a mistake, as NASA Administrator Griffin has made clear. The intent was better explained in the following sentences in the NASA response, which noted that the airlines and aviation industry may have a commercial interest in this data. It does not reflect any conclusions drawn from the data. NASA regrets any impression that the Agency was in any way trying to put commercial interests ahead of public safety. That was not, and never will be, the case.

ANSWERS TO POST-HEARING QUESTIONS

Responses by James E. Hall, Managing Partner, Hall and Associates, LLC; Former Chairman, National Transportation Safety Board (NTSB)

Question submitted by Representative Daniel Lipinski

Q1. The FAA has responded to the stories on NAOMS by pointing out how safe the skies have been in recent years. At the same time, congestion at airports has been growing, we have had several near-miss collisions at airports just this year, and the projections are that aviation traffic will keep growing. Are the safety systems in place today adequate to meet the emerging challenges in aviation?

A1. I am pleased that the question asked for comments on the adequacy of our nation's current safety structure to address rising challenges, particularly when many falsely believe that our past safety successes are sufficient to guarantee continued success in the future. In short, Rep. Lipinski, the answer to your question is no.

The FAA is correct in pointing out that the skies have been safer in recent years. In the ten year period following the 1996 Gore Commission, the airline industry successfully reduced fatal accidents by 65 percent. It is certainly safer to fly today than it was ten years ago. However, there are two major reasons why this success, while laudable, should not lead us to conclude that all is well in the aviation industry.

1. Safety Requires Constant Vigilance

The ten-year reduction in fatal accidents was the product of substantial changes—most of which were recommended by the Gore Commission—on the way the FAA, NTSB, DOT, airlines, and others handled safety and regulation. These changes occurred largely in response to two high-profile accidents and the general trends of rapid expansion in the industry, technological and aircraft design development, and large projected increases in passenger volume.

In other words, while prior to 1996 we had an aviation safety framework—and though overall aviation safety had increased in the preceding 40 years—that framework was deemed no longer adequate to meet future challenges. The current safety of the skies that the FAA cites is therefore due to the historical commitment in our nation's safety culture to resist complacency and satisfaction with existing safety frameworks. This commitment to constant vigilance and improvement should continue to be reaffirmed.

2. Nine Fatal Accidents Per Year: The Next Generation of Risks

Today there are dangerous trends in the aviation industry that could pose serious safety risks if we do in fact regress to complacency. As you note in your question, near-miss incidents are still a major concern and congestion and volume are soaring. Near-misses are illustrative of the new challenges facing aviation safety. Because we have reduced the number of major mishaps and fatalities we must analyze such close-calls and nonfatal incidents in order to see if hidden dangers lurk beneath the surface of seemingly positive statistics. This is why the denial of the NAOMS data was so particularly distressing.

Airport congestion and volume, for their part, are but some examples of what I call the "Next Generation of Risks," which also includes a dramatic shortage of air traffic controllers, pilots, and technology upgrades. Perhaps the most significant statistic I can find in response to your question is that cited in the February 2007 GAO study (*Federal Aviation Administration: Challenges Facing the Agency in Fiscal Year 2008 and Beyond,* GAO–07–490T), which stated that:

> **"although the system remains extraordinarily safe, if the current accident rate continues while air traffic potentially triples in the next 20 years, this country would see nine fatal commercial accidents each year, on average."**

Nine fatal accidents and hundreds or thousands of deaths per year would not only represent an annual tragedy and dramatic reversal of historical safety trends, but would also severely affect the confidence of the flying public—ironically, the very reason NASA initially provided for withholding the NAOMS data.

Clearly, we do not currently have the safety system necessary for the next generation of risks. The FAA estimates it will lose about 70 percent of the air traffic controller workforce over the next 10 years. In 2009, airlines will have to fill 20,000 pilot openings due to retirements and other factors. Passenger volume is projected to reach one billion by 2015 and close to 2.3 billion by 2027. Numerous other potential dangers to aviation safety also exist, but perhaps the greatest threat is the idea that because we are safe now, there is no cause to worry or even think about future hazards. Nothing, in fact, could be more dangerous to the aviation traveling public.

I applaud the Committee's past and recent attention to aviation safety and I urge the Members to continue to exercise their vital oversight role as a driving force behind safety improvement and reform. Chairman Gordon, thank you again for the opportunity to be of service to yourself, the Committee, and the Congress. Please do not hesitate to contact me if I may be of any further assistance.

ANSWERS TO POST-HEARING QUESTIONS

Responses by Robert S. Dodd, Safety Consultant and President, Dodd & Associates, LLC

Questions submitted by Chairman Mark Udall

Q1. In his testimony at the hearing, NASA Administrator Griffin compared the NAOMS project with the existing Aviation Safety Reporting System (ASRS), stating that "One of the primary differences between ASRS and this survey was that ASRS is managed by aviation specialists. When a report is made, the aviation specialists can contact the submitter of the report and ask follow-up questions. They are knowledgeable about aviation safety. This (NAOMS) survey was conducted by telephone polling surveyors who have no knowledge or had no knowledge at all as to aviation or aviation safety. They had no domain expertise and it is precisely that which has led to some of the problems that we are discussing today."

Q1a. Do you agree or disagree with Administrator Griffin's characterization? Why?

A1a. I do not agree with the Administrator's characterization. There are two implicit assumptions in his statement that are in error. One relates to interviewer expertise and the other implies that NAOMS and ASRS are similar.

First, the Administrator implied that having knowledgeable aviation interviewers is preferred because it allows the interviewer to conduct follow-up questions with the interview subject to capture additional information, or perhaps answer questions if the interview subject was confused about a particular question. While on the surface this may appear to be the preferred approach, it is in reality the wrong approach.

It is vitally important in survey research that the questions be applied in the same way for each interview subject. This is a basic and fundamental characteristic of any quality survey. The way questions are asked matter and can influence how an interview subject responds. Consequently, questionnaires must be carefully designed AND interviewers trained to conduct the interview in the same way each and every time.

NAOMS interviewers were not allowed to deviate in any way from the prepared questionnaire. The questions were designed to be clear. For the vast majority of questions, pilots were not confused and did not ask for clarification. For those few questions where pilots did ask for clarification, the NAOMS team prepared scripted responses in advance for the interviewers to use for the most common clarification questions. That was the only acceptable response if a pilot asked a question.

NAOMS interviewers were professional interviewers who had extensive experience in conducting interviews. They were trained to conduct the NAOMS interview over three separate sessions lasting a total of 12 hours. Each interviewer was then certified to conduct the interviews through simulated interviews with NAOMS aviation experts posing as pilots. As mentioned, their performance was also randomly monitored by their managers.

NAOMS interviewers were not aviation experts and this was preferred. The NAOMS team did not want the interviewers to offer impromptu responses to pilots if they asked questions about the survey or a particular question. The goal was for each question to be asked the same way each time it was applied. Aviation knowledge was not required for this to occur. What was required was professional and disciplined interviewers experienced in conducting telephone interviews. NAOMS interviews were also randomly monitored so managers could ensure this basic tenet was being followed.

The second assumption that appeared in the Administrator's statement is that NAOMS and ASRS are in some way compatible. The programs are similar in that they both collect data on aviation incidents from pilots but they are very different in their design and goals.

The ASRS is a voluntary reporting system where the PILOT INITIATES the contact with NASA to report an incident they experienced. NAOMS is voluntary reporting system where the PILOT IS ASKED to voluntarily provide information on incidents he or she may have experienced. ASRS is designed to collect information on a SPECIFIC INCIDENT while NAOMS is designed to collect information on the frequency of occurrence of a BROAD RANGE OF INCIDENTS.

ASRS data cannot be used to estimate the frequency of safety events in the National Airspace System (NAS) but ASRS reports are very useful in understanding why a particular event occurred. NAOMS on the other hand was designed to provide accurate estimates on how often events occurred and to measure changes in event rates over time but NAOMS was not designed to collect data on why events occurred. NAOMS was designed to provide a method for the ongoing systematic collection, analysis and interpretation of the frequency of incidents in the NAS for use in assisting the planning, implementation and evaluation of the Nation's air safety system.

Q1b. If the NAOMS project ere to be restarted would there be any changes that you think should be made either to the methodology or implementation of the project?

A1b. The biggest issue that would need to be addressed would be the establishment of an advisory board and working group. The advisory board would address strategic issues such as funding, operating agreements among organizations and oversight of the program. The working group would provide guidance on survey methodology and application, data analysis, publications and recommendations to the aviation industry. Both of these organizations would need to support the program and believe in its value. NAOMS NASA staff tried to engage the aviation community and encouraged the development of a working group. This was not successful. That lack of success may have been related to fear of the results, lack of confidence in survey methods, and lack of certainly on how the data might be used. In any event, this in my opinion was the key factor that doomed NAOMS to failure.

The second largest issue that would have to be addressed would be establishment of a reliable funding stream for NAOMS not subject to the variations in agency budget cycles. (It is assumed that NAOMS would be operated by a government entity.) Ideally, NAOMS should receive funding directly from Congress until it was fully accepted and integrated into the Nation's aviation safety oversight system. Reduced funding once the system was operating would cause a compromise in data quality and usefulness. This would likely happen if NAOMS was part of an Agency's budget.

The last issue that would need to be addressed would be revisions to the NAOMS survey process. The questionnaire for the Air Carrier pilots is mature and well vetted but it should be reviewed for acceptance by the working group and modified accordingly (without compromising technical accuracy). The General Aviation pilot survey would require more work to ensure it was measuring safety incidents as intended. Finally, development work would have to be initiated to include other aviation safety stakeholders like maintenance technicians, air traffic controllers and others.

Questions submitted by Representative Daniel Lipinski

Q1. Peggy Gilligan, the Deputy Associate Administrator for Aviation Safety at the FAA recently cast doubt on the survey by questioning NASA's methodology. For example, she is quoted as stating that the answers in the study were not sufficiently detailed. Further, Dr. Griffin's testimony highlights inconsistencies in the study as compared to surveys conducted in other ways and also calls into question the validity of the methodology. Dr. Dodd, your testimony explains that the process was meticulously designed and very thorough. Could you elaborate on your work on the survey and explain why others may call the study into question?

A1. It is difficult for me to respond to Question One since the criticism of the NAOMS questions and study methodology are offered in the abstract without specific citations or examples. It should be noted that both FAA and NASA management had numerous opportunities to review and comment on the NAOMS questions, the program design and the associated methodology. These opportunities were afforded the FAA and NASA through two industry workshops, numerous industry briefings, and program reviews. Critical comments and questions were offered by NASA and FAA and the NAOMS team was responsive.

I think FAA and NASA criticisms however highlight two failings of the NAOMS team and the aviation industry at large. Ideally, detailed criticisms should have been vetted and discussed within the context of a vibrant and engaged industry working group so that such concerns could have been addressed while the program was operating. This type of procedure would have resulted in a stronger product. This didn't happen because no ongoing working group was ever successfully established and functional. The failure was NASA's inability to establish an engaged working group that was supportive of the project. NASA staff tried but the aviation industry was not supportive.

The second failure was not having the NAOMS questionnaire and underlying methodology reviewed and critiqued by survey methodology experts not affiliated with the NAOMS team or the aviation community. This demonstrated a certain naiveté on part of the NAOMS team. Such a review should have been accomplished by experts who could comment knowledgeably on survey program development and design, questionnaire development, data security and respondent anonymity and other issues. This wasn't done and consequently, the NAOMS team continues to respond to criticisms of the survey design and methodology by organizations not well versed in such issues.

While NASA and FAA are certainly entitled to their opinion, their organizational expertise does not lie in survey research. Criticisms of the NAOMS methodology should be considered within the context of the background and knowledge of those offering the criticism.

Q2. How would NAOMS data be used by an aviation safety expert to improve safety in the skies?

A2. NAOMS was modeled after a public health epidemiologic surveillance system. The Centers for Disease Control and Prevention (CDC) states a surveillance system is "the ongoing systematic collection, analysis and interpretation of . . . data for use in the planning, implementation and evaluation of public health practice." [1] In the case of NAOMS, "public health practice" could be replaced with the term "aviation system safety."

NAOMS was designed to accomplish two different tasks. First, it was designed to reliably track aviation safety incident trends. This was accomplished by asking a routine set of questions that remained constant over time. If a "statistically valid" increase in a particular response (trend) was noted then the appropriate safety experts in government and industry would determine if the trend was of concern. If so, then an appropriate supplemental investigation would be initiated to determine why the trend was changing.

Tracking trends would allow safety experts to recognize changes in the aviation system before losses occurred. Additionally, NAOMS event trending would allow aviation safety experts the ability to measure the positive effects of safety enhancements. If a particular safety enhancement was working, reported events (trends) associated with that issue should decrease.

In addition to the ability to accurately measure and track safety incident trends, NAOMS was also designed to collect information on targeted or special topics. These would have been small focused data collection efforts on particular topics of interest. The NAOMS questionnaire was designed to be flexible so questions could be added to evaluate a particular topic such as the introduction of a new technology or new procedure. Data would be collected for a specific period of time (determined by the need) and evaluated. Once the data collection and associated evaluation was completed, the data collection for that topic would stop and questions for a new topic added if needed. The ability to trend data over time, and to evaluate specific issues relatively quickly,[2] is a very powerful combination for safety oversight.

The NAOMS team envisioned NAOMS trend analysis to be an automated and ongoing process. Evaluation of the trends would be done regularly with exceedance limits set so notification of meaningful changes would be automatic. Manual review of the results would occur monthly. The industry working group and other interested parties would receive regular updates and immediate notice if worrisome trends emerged. Regular meetings of the working group were envisioned for review of the data. Publication of annual reports summarizing the data collected over the previous year was also planned.

NAOMS was designed to be an early warning system and a method by which to collect targeted safety information quickly, reliably and cheaply. NAOMS was never designed to replace current safety initiatives but to supplement current information systems and provide capabilities currently not available.

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[1] Thacker SB, Berkelman RL, Public Health Surveillance in the United States, *Epidemiological Review,* 1988; 10:164–90.

[2] The NAOMS team estimated that a special topic section could be added to the questionnaire in about three months.

ANSWERS TO POST-HEARING QUESTIONS

Responses by Jon A. Krosnick, Frederic O. Glover Professor in Humanities and Social Sciences, Stanford University

Questions submitted by Chairman Mark Udall

Q1. In his testimony at the hearing, NASA Administrator Griffin noted that a "2004 Review of NASA's Aerospace Technology Enterprise by the National Academies concluded that there was not a compelling argument for continued independent data collection in the NAOMS project." He went on to quote the Review as stating that the "NAOMS Project seems to be developing a methodology to establish trends in aviation safety performance that are already available through other sources within industry and government." Do you agree with the National Academies assessment? If not, why not?

A1. The National Academies Panel spent about one hour with the NAOMS team amidst a long visit they paid to Mountain View, California, to collect information on an array of projects in addition to NAOMS. The Panel did not receive a detailed briefing on the NAOMS methodology, its development, or the data that had been collected. Thus, the panel was limited in its ability to fully understand the project.

In its written report, the Panel stated the following:

> "NAOMS consists of a longitudinal survey of aircraft operators, gather information about safety-related experiences of pilots, cabin crews, and maintenance operators for both general aviation and air carriers. . . . It provides statistically reliable results about the frequency of occurrence of safety-related incidents." (*An Assessment of NASA's Aeronautics Technology Programs,* 2004, p. 100).
>
> "The NAOMS approach is built on research and implementation of national surveys such as those of the Bureau of Labor Statistics. The NAOMS sampling methods have been grounded in sound interview polling science."

Thus, the Panel believed that the NAOMS project was intended to include data collection not only from pilots but also from flight attendants and mechanics. And the panel recognized that the NAOMS methodology was well established and credible.

The Panel did not conclude that NAOMS should be terminated. Instead, they recommended that "NASA should combine the National Aviation Operations Monitoring Service methodology and resources with the Aviation Safety Reporting System program data to identify aviation safety trends."

The Panel did express concern about the issue of potential redundancy with other data sources but mentioned only one instance of such overlap: engine shutdowns, which are tracked by the FAA. The Panel did not provide a thorough analysis of the extent of such redundancy.

In fact, there was a very small degree of such overlap, and it was intentionally designed into the NAOMS data collection system. The purpose of this overlap was to allow for cross-validation of the NAOMS measurements. That is, we expected to find similar rates and trends in the NAOMS data as would be seen in the FAA data on engine shutdowns, as long as the NAOMS survey question wording exactly matched the specifications of the records being kept by the FAA. If we were to see such correspondence across data sources, that would be reassuring about the validity of the NAOMS data. Building questionnaires with such a plan for validation is a normal part of designing a new questionnaire-based measurement system.

If NAOMS were to reveal levels of and trends in event rates that corresponded closely with rates and trends of the same events as measured in other ways, questions addressing these events could then have been removed from the NAOMS questionnaires. But if NAOMS rates and trends turned out to be very different from those produced by different data sources, this would merit further investigation. The discrepancy could be attributable to inadequacy in either or both measurement methods, and it would be worthwhile to investigate both possibilities.

For example, NAOMS event rates may be considerably higher than those yielded by voluntary or mandatory airline or government reporting systems because people must take the initiative to report events via the latter systems, and if some people accidentally or intentionally fail to report some events, the registered rates in the administrative records will be misleadingly low. Much as we might hope that employees will fully and properly participate in all voluntary and mandatory reporting systems, it is possible that they do not. This possibility should not be disregarded when comparing NAOMS event rates to rates of the same events monitored in other ways.

In sum, the NAS Panel did note redundancy between NAOMS and other record-keeping systems, but only a very small proportion of events measured by the NAOMS questionnaires were being tracked with other methods. Indeed the purpose of NAOMS was to track reliable trends in types of events not being measured in any other ways.

Q2. In his testimony at the hearing, NASA Administrator Griffin compared the NAOMS Project with the existing Aviation Safety Reporting System (ASRS), stating that "One of the primary differences between ASRS and this survey was that ASRS is managed by aviation specialists. When reports are made, the aviation specialists can contact the submitter of the report and ask follow-up questions. They are knowledgeable about aviation safety. This [NAOMS] survey was conducted by telephone polling surveyors, who have no knowledge or had no knowledge at all as to aviation or aviation safety. They had no domain expertise, and it is precisely that which has led to some of the problems that we are here discussing today."

Q2a. Do you agree or disagree with Administrator Griffin's characterization? Why?

A2a. Dr. Griffin was correct when he said that the ASRS is *"managed"* by aviation specialists. This was true for NAOMS as well.

Dr. Griffin was not quite correct in saying that "the aviation specialists can contact the submitter of the report and ask follow-up questions." The managers of the ASRS program do not contact event reporters.

Instead, retired pilots and other air travel professionals are employed by ASRS as interviewers. These individuals routinely telephone pilots who submit reports to ASRS to debrief them and acquire details about the event not provided by the written report. This is a key feature of the ASRS data gathering system: its focus is not on quantitative trends but rather is on gathering rich qualitative information about the events that pilots choose to report.

In contrast, NAOMS is not designed to collect such rich contextual information. Rather, NAOMS is designed simply to count events and track trends. It is therefore not necessary for telephone interviewers to have expertise in aviation, because their task is simply to read aloud well designed and technically correct questions to pilots and record the counts of events that the pilots report. NAOMS' question wordings were crafted through an extensive process of pretesting to assure that they would be clear and understandable as administered in this fashion and would not require aviation expertise from the interviewers.

In fact, it would be undesirable for the interviewers to engage in any conversation with the survey respondents about the events they report—doing so would violate one of the central premises of high quality, objective survey data collection: interviewers must read the exact same question in exactly the same way to all respondents and provide no feedback on the answers provided, so as to minimize any potential for interviewer-induced bias.

Nonetheless, the NAOMS interviewers did receive some training in aviation matters from an experienced pilot before they began conducting the NAOMS interviews. The purpose of this training was to clarify the meanings of the questions and terminology in the questionnaire, so that the interviewers could competently handle any unexpected interchanges with respondents on technical issues.

Furthermore, there is no factual basis for Dr. Griffin's claim that lack of domain expertise among the interviewers *"has led to some of the problems that we are here discussing today."* Because the job of the interviewers was to read the questions and record the answers accurately, lack of domain expertise could not have accounted for any of Dr. Griffin's concerns about the data.

Q2b. If the NAOMS Project were to be restarted, would there be any changes that you think should be made to either the methodology or implementation of the Project?

A2b. If the NAOMS data collection were to be restarted, I would recommend the following:

1) Conduct thorough analysis of the data collected already by NAOMS, in comparison with other databases tracking some of the same events, to assess the quality of the NAOMS data.
2) Restart telephone interviewing of air carrier pilots using the same interviewing methodology as was being used when data collection was suspended.
3) Draw samples of air carrier pilots to be interviewed from the full population of licensed pilots. The FAA maintains an updated list of this population, so

the samples should be drawn from this list. A subset of this list has been made available to the public, but because that public subset is only partial, the NAOMS sample should be drawn from the full FAA list.

4) An external advisory committee should be formed to oversee and advise on all data collection activities, following the example set by most major survey data collection projects funded by the Federal Government. This committee should be composed of a mixture of aviation and survey research experts. Ultimately, all design decisions regarding implementation of NAOMS data collection should be made by the project's Principal Investigator(s), based upon the advice of the advisory committee.
5) The data that are collected each month should be released in electronic files accompanied by full written documentation of the data collection procedures as soon as possible after each month's interviewing is completed.
6) All releases of data should be accompanied by written documentation telling analysts how to properly compute event rates and over-time trends. Because the design of the survey is complex, such documentation will be useful to help assure that the public does not draw unfounded inferences from the data.
7) The Principal Investigator of NAOMS should issue monthly reports documenting rates and trends in the recently collected data, modeled after the press releases put out by the Conference Board and the University of Michigan's Survey Research Center documenting their monthly surveys measuring consumer confidence.
8) Data collection from general aviation pilots should be restarted using the procedures that NAOMS employed prior to data collection suspension.
9) Data collection from air traffic controllers, flight attendants, and mechanics should be initiated after preparatory design work is initiated and completed. This preparatory work should include focus groups and other data collections to build a list of events to ask about, experimental studies to document optimal recall period lengths for these professionals, and studies to document the predominant organization of events in these professionals' memories. Data should be collected from these individuals via telephone interviewing.
10) In keeping with the National Academy of Sciences recommendation, it would be desirable to coordinate NAOMS data analysis with ASRS data analysis. Whenever possible, trends in ASRS reports for an event should be compared with NAOMS trends of the same event to explore comparability. Likewise, NAOMS rates should be compared with rated generated using any other data sources tracking a small number of events measured by both NAOMS and other record-keeping systems.

Questions submitted by Representative Daniel Lipinski

Q1. Peggy Gilligan, the Deputy Associate Administrator for Aviation Safety at the FAA, recently cast doubt on the survey by questioning NASA's methodology. For example, she is quoted as stating that the answers in the study were not sufficiently detailed. Further, Dr. Griffin's testimony highlights inconsistencies in the study as compared to surveys conducted in other ways and also calls into question the validity of the methodology. Dr. Krosnick, your testimony explains that the process was meticulously designed and very thorough. Could you elaborate on your work on the survey and explain why others might call the study into question?

A1. I was invited to help with the development of NAOMS because the project sought to design surveys of the highest quality to produce the most accurate measurement possible according to best practices of survey research used throughout the Federal Government.

I served as an advisor to the team that carried out the work. Specifically, I attended numerous project planning meetings and public dissemination meetings (at which I made presentations on the science behind the survey component of the project and the findings of our pretest studies). I designed a series of pretesting studies to ascertain (1) the optimal length of time to include in the period that respondents would be asked to describe, (2) the order in which the questions should be asked, and (3) whether the data should be collected by telephone interviewing, face-to-face interviewing, or paper and pencil questionnaires. I oversaw the analysis of data collected in those studies and oversaw the process of writing reports describing their findings. I also participated in the design and implementation of focus groups held with air carrier pilots, air traffic controllers, and general aviation pilots to build lists of safety-related events that they witnessed while working. I oversaw the process of conducting cognitive think-aloud pretesting interviews with air carrier pilots to assure that the questionnaires were understandable. And I provided advise on most other aspects of the study design.

My goal in providing this advice was to be sure that NAOMS design decisions would yield the most accurate possible measurements.

Many observers have raised concerns about the reliability of the NAOMS data. These include administrators at the FAA and administrators at NASA.

Some expressions of concern have addressed the procedures used to collect the NAOMS data. These concerns were articulated prior to the public release of a full report by Battelle describing the procedures used to collect the data and the rationales for those procedures (as far as I know, that report has not yet been publicly released). It therefore strikes me as premature for anyone to offer opinions about inadequacies in the NAOMS procedures.

For example, Dr. Griffin expressed concern that the NAOMS interviewers were not aviation experts and were not tasked with collecting detailed information about safety-related events through conversational interviewing. As I explained above, this approach to interviewing is appropriate for ASRS but not for NAOMS. Standard practice in high quality survey interviewing involves reading the same questions identically to all respondents and not offering any additional comments or improvising conversation with the respondents, so as to minimize the potential for such improvised conversation to bias respondents' answers. Thus, concerns about lack of aviation experience among the interviewers are misplaced.

Other expressions of concern have focused on the rates of events documented using the NAOMS data. For example, during his testimony, Dr. Griffin mentioned that NAOMS indicated that diversions to alternate airports occurred at implausibly high rates. Some other NAOMS critics have similarly articulated concerns that NAOMS rates vastly exceeded rates of the same events documented by other monitoring mechanisms.

I believe that there are at least two possible reasons for these expressions of concern. First, the NAOMS surveys were designed to yield multiple measurements of the same event, and any rate calculations must be made adjusting for this multiple registering of single events. In Appendix A of this letter, I explain how statistical calculations must be implemented to correct for this inherent aspect of NAOMS data collection.

I am concerned that this sort of calculation correction was not implemented properly by people who have analyzed the NAOMS data to date. If so, this would lead to the misleading impression of event rates much higher than really occurred and much higher than other data sources might indicate.

A second possible reason for concern about NAOMS rates is inadequate attention to the details of the wording of the NAOMS questions and the measurement being made by other data sources. Consider, for example, Dr. Griffin's testimony that NAOMS data indicated that four times per day, a transport aircraft was landed at an unscheduled airport in order to deal with an unruly passenger. Dr. Griffin said that to his knowledge, that has happened a total of two or three times since September 11, 2001.

If such a discrepancy were really present between the NAOMS data and administrative records of such events, it would be a basis for concern about the accuracy of one or both of those streams of data. But in fact, the discrepancy Dr. Griffin pointed to is an illusion.

In fact, the NAOMS survey did not ask the pilots to report how many times they had to land an airplane at an unscheduled airport in order to deal with an unruly passenger. Instead, the NAOMS question asked: "During the last 60 days, how many times did an in-flight aircraft on which you were a crew member expedite landing or divert to an alternate airport due to a passenger disturbance?" Notice that this question combines diversions with expedited landings. It is therefore not appropriate to compare the total number of NAOMS reports of events in this category with another measuring system's assessment of the number of times that unruly passengers caused diversions to alternate airports. Of course, the NAOMS question will yield higher rates than the other monitoring system will.

These are two of the possible reasons for unfounded concerns about the accuracy of NAOMS data: incorrect computation of statistics using the data, and insufficient attention to the details of the survey question wordings and the types of events tracked by other monitoring systems. Mistakes of the sort outlined above would cause the illusory appearance of implausibly high event rates in the NAOMS survey.

Assuming that such calculation and interpretation mistakes have been made and have led to a misperception that NAOMS event rates are unusually high, it is understandable that people observing those rates might take them to be dangerous if released publicly, for at least two reasons. First, as the NASA FOIA appeal reply outlined, reports of event rates much higher than have been recognized might cause public concern about the safety of flying and impact the economic viability of commercial airlines. Based on my knowledge of the risk perception and decision-making literatures generated by social and behavioral scientists, I believe that releasing such numbers in the context of a public report about NAOMS is very unlikely to increase public fear of flying or decrease airline passenger loads. But it is certainly possible. So an observer within NASA or the FAA might fear negative consequences of releasing high rates based on NAOMS data.

Second, staff within the FAA may perceive that event rates higher than those yielded by their own monitoring systems could call those monitoring systems into question. And in fact, that is just what higher rates from NAOMS should do, in my opinion. Staff members who wish to protect the appearance of integrity of those systems might prefer that such concern not be raised in the public mind. But in my opinion, every measurement system is potentially subject to error, so it is always preferable to track important events using multiple measuring tools and to check their correspondence. Rather than assuming that one measuring tool is necessarily correct and the other is inaccurate, a discrepancy should inspire scrutiny of the implementation of both methods. Such scrutiny may lead to the detection of flaws in either or both measuring systems, which can in the end inspire repairs that enhance accuracy of assessments in the future.

In sum, I believe that some observers may be motivated to criticize NAOMS because of perception that NAOMS yielded implausibly high event rates. After careful and proper statistical calculations are implemented, accompanied by careful attention to the exact wordings of the NAOMS questions, these rates may turn out to be considerably lower and may match rates of events tracked using other monitoring systems.

Q2. Dr. Krosnick, you are a renowned expert on survey methodology and statistical analysis brought in as a subcontractor on the NAOMS project. Did the process used to develop the NAOMS survey instrument seem inadequate in any way? Did you lack expert feedback—peer review—as the methodology of the project went forward?

A2. I believe that the NAOMS development process was indeed consistent with best practices in survey methodology. Indeed, in some ways, the preparatory design work exceeded that done for many major, long-standing federally funded and administered survey research projects. And the very high response rates that typified NAOMS are evidence of little if any non-response bias in the resulting data. In sum, I believe that NASA did an excellent job of funding top-level methodological work and that Battelle and its subcontractors did their work to the highest standards of excellence.

The NAOMS project implemented survey methods that have been extensively peer reviewed and have been widely accepted as standard practice in the industry for decades. The tailoring of implementation of those procedures to the NAOMS context was also done using pretesting procedures that have well-established status in the methods literature.

As I mentioned during my oral testimony, the project sought peer commentary and suggestions by social scientists and aviation experts at many public and private briefing meetings. These conversations yielded useful suggestions that influenced the design of NAOMS. In addition, the White House Office of Management and Budget reviewed the NAOMS procedure in order to approve its data collection. OMB routinely evaluates federal survey project methodology and makes suggestions for improvement, and we benefited from this process as well.

The only potentially valuable form of peer review that was not implemented but might have been helpful would have entailed forming a committee of peer reviewers who were paid to critique the methodology as harshly as possible and to suggest alternative methods to implement the survey. I believe that such a procedure would most likely have yielded few if any suggestions of changes to the methodology that was employed. But it could have been done prior to NAOMS' suspension and could still be implemented today.

Appendix A:

Explanation of Inflated Probabilities of Event Occurrences in NAOMS Data

This Appendix explains why each event that occurs during the course of air travel has an inflated probability of occurrence in the NAOMS survey, by design, because it is witnessed by multiple people. And this Appendix explains how correction for this aspect of the survey design must be implemented in order to properly generate estimates of rates of events.

Consider, for example, the NAOMS question asking pilots to report the number of times a bird hit a plane on which he/she was working. Each such bird strike would be witnessed by at least two pilots (the pilot and co-pilot) and could have been witnessed by three pilots (on aircraft with a third working cockpit crew member). Thus, the probability that each bird strike would be reported by some respondent in the survey was twice or three times as high as would have occurred if only one person had witnessed each event. And for events that involve two aircraft at the same time (e.g., a near miss), between four and six cockpit crew members will witness the event.

Some observers have asserted that such inflated probabilities can be ignored, because the relatively small number of pilots interviewed each month relative to the total population of pilots means that the chances that the same event will be reported in the survey by two different respondents is extremely small. That is true, but it is irrelevant to the multiple-counting issue: each event nonetheless has twice or three times the probability of being reported by someone.

To illustrate how the calculation of event rates must be done, imagine that there are 10,000 total active air carrier pilots and that 1,000 of them were interviewed and asked to describe events that occurred during some or all of January, 2001.[1] Imagine further that during these interviews, the total number of January bird strikes reported by all respondents was 50.

To calculate the total number of bird strikes that occurred in January, it might be tempting to divide the number 50 by the sampling fraction (1,000/10,000), which would equal 500. But this would be incorrect.

To calculate the total number of events properly, it would be necessary to use information from the NAOMS questionnaires about the type of aircraft flown by each pilot who reported a bird strike to infer whether that bird strike was most likely witnessed by only two pilots or three pilots (this can be determined by type of aircraft). Then each bird strike report must be divided by the total number of pilots who would most likely have witnessed it (two or three)—so some bird strikes would contribute one-half to the total and others would contribute one-third to the total. Then the resulting fractions could be added up across respondents, divided by 1,000 and multiplied by 10,000 to yield an estimate of the total number of bird strikes that occurred during January.

Another calculation method would involve dividing the total number of bird strikes reported to have happened during January, 2000, by the total number of hours that the interviewed sample of pilots said they flew during that month or by the total number of flight legs that the interviewed sample of pilots said they flew during that month. These rates could then be multiplied by the total number of flight hours flown by all pilots during the month or by the total number of legs flown by all pilots during that month, respectively. But again, these numbers would be inappropriately high, because they would be inflated due to the doubled or tripled probability of reporting the same event by multiple witnesses. So again, each respondent's report of an event should be counted as either one-half or one-third (depending on whether two or three cockpit crew were working on the aircraft); these fractions should then be summed, and the total should be multiplied by the total number of hours or legs flown by the entire population of pilots during the month of interest.

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[1] Remember that some NAOMS respondents were interviewed on almost every day of each year, and they were asked to report the total number of events of each type that they witnessed during the past 60 days. Therefore, some respondents will have made reports for periods including all of January, 2001. And other respondents will have made reports for periods including only part of that month. Therefore, the data from different respondents must be integrated carefully, to recognize the fact that some people's reports included a mixture of days in January and days in other months.

ANSWERS TO POST-HEARING QUESTIONS

Responses by Captain Terry L. McVenes, Executive Air Safety Chairman, Air Line Pilots Association, International

Question submitted by Representative Daniel Lipinski

Q1. When Battelle ran this project, the names of survey participants were removed from their records within 24 hours of the conclusion of their survey. Is that the kind of step that you would endorse in any other survey of this kind?

A1. Participation in the survey by pilots was done under the assumption that it would be completely confidential. That premise was key to getting open and honest reporting. As I understand it, follow-up questioning wasn't part of the methodology used in the survey and the names of the participants wasn't germane to the type of questions asked. Consequently, it is my belief that future surveys of this type should also de-identify the participants as was done in the NAOMS survey. This would further promote the confidence in that confidentiality as well as provide the industry with quality safety information.

Appendix 2:

ADDITIONAL MATERIAL FOR THE RECORD

Exhibit #1

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Los Angeles Times

PART-A; Metro Desk

Danger on the Ground, Too Safety: Near-misses have occured on runways and taxiways, federal records show. Pilots were sometimes lost or controllers moved planes into another's path.

WILLIAM C. REMPEL; DAVID FREED
TIMES STAFF WRITERS
1,236 words
3 February 1991
Los Angeles Times
Southland
3
English

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While the crowded skies above Los Angeles International Airport have been recognized as among the most hazardous in the nation, it is on the ground-in the airport's maze of runways and taxiways-where many accidents and harrowing near-misses have occurred in recent years, records show.

In June, 1989, a jetliner taxied onto Runway 25-Right for takeoff at the same time another jetliner was preparing to land on the same runway. The landing plane, which apparently was coming in on the wrong runway, aborted its approach to avoid a collision.

On other occasions, pilots have become lost on taxiways at the Los Angeles airport, strayed onto active runways and have landed or completed takeoffs while narrowly missing other aircraft on the runways, according to pilot and controller reports filed with the National Aeronautics and Space Administration and reviewed Saturday by The Times.

Officials of the National Transportation Safety Board have warned repeatedly that ground accidents at busy U.S. airports, including in Los Angeles, pose a "high potential for catastrophe," and they have placed a high priority on improving ground safety.

After the fatal collision Friday night between an arriving USAir jetliner and a departing SkyWest commuter plane, local pilots and others contended that, given the number of less-serious ground accidents and near-misses that preceded it, this catastrophe was only a matter of time.

No one had died in a commercial aviation accident at the airport since 1978, when a Honolulu-bound Continental Airlines DC-10 blew two tires and made an emergency landing after aborting takeoff. Three people were killed.

A handful of other instances have occurred more recently in which planes slammed or slid into each other while taxiing, but no one has been seriously injured.

The world's worst aviation accident occurred on a runway in the Canary Islands in 1977, when two Boeing jumbo jets collided in fog, killing 583.

From the air, Los Angeles International is a relatively simple airport-two parallel sets of runways separated by the bulk of the airport's passenger terminals.

But trying to safely place airplanes in sequence as they land and take off on those same runways can be a nightmare, particularly at peak hours such as Friday evening, air traffic controllers say.

All manner of aircraft, big and small, fast and slow, fly in and out of the Los Angeles airport. Coordinating them requires that controllers gauge how long it will take a departing plane to leave a runway to avoid another plane that may be coming in seconds behind it.

The potential for accidents, experts say, may be compounded by the fact that Los Angeles ground controllers do not always direct pilots to taxi to the ends of runways before taking off. Pilots of smaller planes, whose aircraft generally need less distance to get off the ground than larger jetliners, frequently are cleared for takeoff from runway intersections.

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It was from such an intersection that the departing SkyWest plane turned onto Runway 24-Left, where it was struck by USAir's incoming Flight 1493.

"That airport is known for this kind of problem," said John Galipault, president of Aviation Safety Institute in Worthington, Ohio. "It's an extremely busy airport, making it very favorable for aircraft to get out onto runways where they shouldn't be."

Last April, a report prepared by the Air Line Pilots Assn. concluded that the airspace around Los Angeles International Airport was among the seven most dangerous flight areas in the United States.

Pilots have found that being on the ground can be no less threatening.

The NASA reports, copies of which were recently obtained under the U.S. **Freedom of Information** Act, show that in January, 1986, a passenger jet barely missed a small private plane that was awaiting takeoff instructions on the threshold of Runway 25-Right. The jetliner's visibility was hampered by an early morning haze, but it was an apparent air traffic controller's error that put both aircraft on the same runway at the same time.

"I phoned the LAX tower and was told that the light plane apparently had been cleared into position (for takeoff), and then they (controllers) had forgotten him," wrote one of the jetliner crew members in his incident report.

In a December, 1987, incident, another disaster was narrowly averted when one pilot decided to extricate himself from taxiway gridlock-and steered into the path of an oncoming jet taking off.

"There were perhaps eight to 10 jets within a 1,000-foot radius of us at this time," the pilot reported. "It appeared we were in a gridlock with no place to go except a taxiway to my left which I believed to be the outer taxiway."

It was not a taxiway but an active runway. To make matters worse, communication with ground controllers was all but impossible because radio frequencies were swamped.

"To help her (the controller) out with her extremely busy workload, I took the initiative to take the turn to the left leading me back to what I thought was the outer parallel but was in fact the runway," the pilot reported. "Simultaneously, we saw aircraft lights facing us."

The pilot hastily turned into a green Tarmac area-safely off the runway-as the other jetliner roared into the night sky.

Only a few days later, another pilot reported taking off over the tail of a wide-body jet that he discovered was jutting out into the runway. The discovery was made too late to abort the takeoff, but as he lifted off the pilot veered left to increase his clearance.

"Had we lost No. 2 engine or blown a tire during takeoff roll, we might have struck that aircraft," the pilot noted in his NASA report. "In our estimation, the tower should have had the wide-body taxi farther off the runway before clearing us for takeoff."

The NASA files are part of the FAA's **safety reporting** system. Air traffic controllers and crew members file the reports voluntarily and, in so doing, can receive immunity from administrative actions against their Federal Aviation Administration certificates.

The Times reviewed scores of NASA reports related to operations at Los Angeles International Airport and found numerous examples of hazardous situations created when pilots taxied across active runways without controller approval or mistakenly turned onto the wrong taxiways.

In one 1988 incident, a crew got lost after it was diverted to an unfamiliar part of the airport to wait for a plane parked at its ramp to depart. Wending their way back to the ramp through a maze of blue taxiway lights, crew members made at least two or three wrong turns until they encountered white lights: They were on an active runway.

"Crew immediately . . . expedited taxi to first exit," the pilot wrote.

Meanwhile, another jet that was descending had to pull up abruptly, missing the wayward aircraft by a scant 200 feet.

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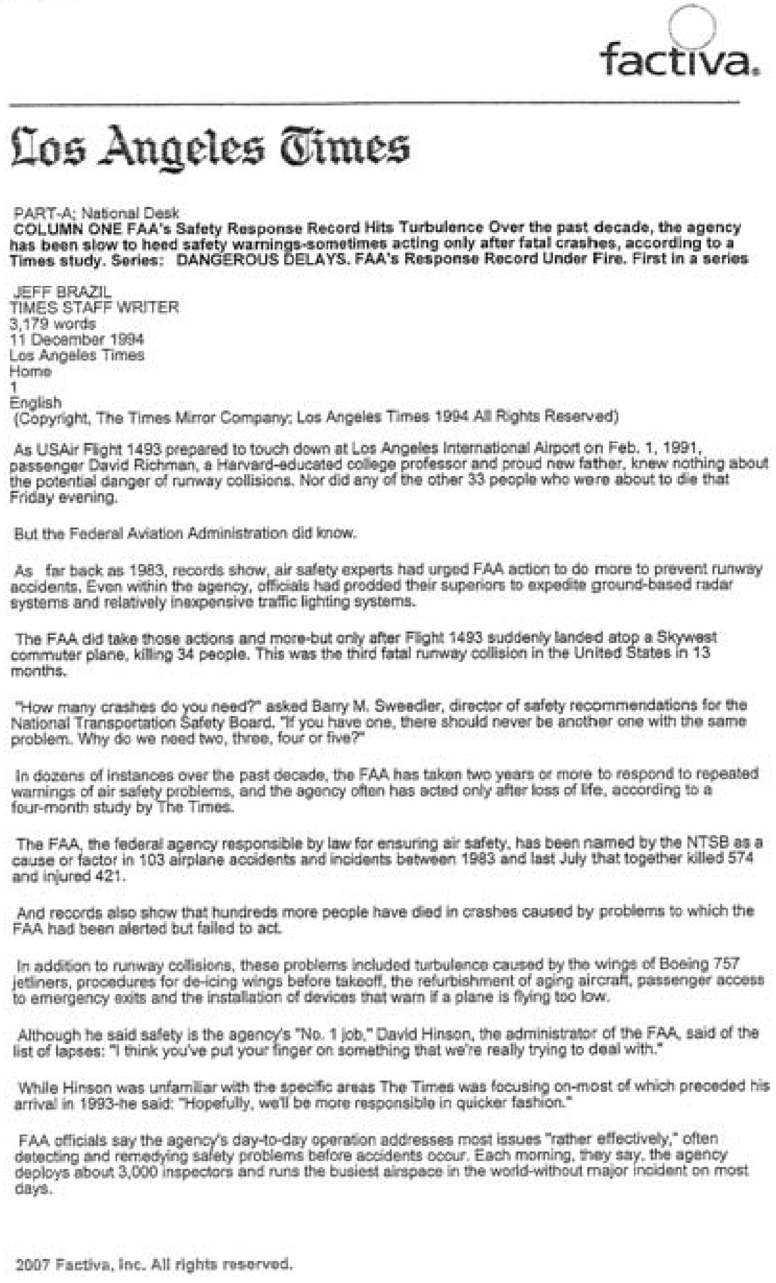
Exhibit #2



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Los Angeles Times

PART-A; National Desk

COLUMN ONE FAA's Safety Response Record Hits Turbulence Over the past decade, the agency has been slow to heed safety warnings-sometimes acting only after fatal crashes, according to a Times study. Series: DANGEROUS DELAYS. FAA's Response Record Under Fire. First in a series

JEFF BRAZIL
TIMES STAFF WRITER
3,179 words
11 December 1994
Los Angeles Times
Home
1
English
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As USAir Flight 1493 prepared to touch down at Los Angeles International Airport on Feb. 1, 1991, passenger David Richman, a Harvard-educated college professor and proud new father, knew nothing about the potential danger of runway collisions. Nor did any of the other 33 people who were about to die that Friday evening.

But the Federal Aviation Administration did know.

As far back as 1983, records show, air safety experts had urged FAA action to do more to prevent runway accidents. Even within the agency, officials had prodded their superiors to expedite ground-based radar systems and relatively inexpensive traffic lighting systems.

The FAA did take those actions and more-but only after Flight 1493 suddenly landed atop a Skywest commuter plane, killing 34 people. This was the third fatal runway collision in the United States in 13 months.

"How many crashes do you need?" asked Barry M. Sweedler, director of safety recommendations for the National Transportation Safety Board. "If you have one, there should never be another one with the same problem. Why do we need two, three, four or five?"

In dozens of instances over the past decade, the FAA has taken two years or more to respond to repeated warnings of air safety problems, and the agency often has acted only after loss of life, according to a four-month study by The Times.

The FAA, the federal agency responsible by law for ensuring air safety, has been named by the NTSB as a cause or factor in 103 airplane accidents and incidents between 1983 and last July that together killed 574 and injured 421.

And records also show that hundreds more people have died in crashes caused by problems to which the FAA had been alerted but failed to act.

In addition to runway collisions, these problems included turbulence caused by the wings of Boeing 757 jetliners, procedures for de-icing wings before takeoff, the refurbishment of aging aircraft, passenger access to emergency exits and the installation of devices that warn if a plane is flying too low.

Although he said safety is the agency's "No. 1 job," David Hinson, the administrator of the FAA, said of the list of lapses: "I think you've put your finger on something that we're really trying to deal with."

While Hinson was unfamiliar with the specific areas The Times was focusing on-most of which preceded his arrival in 1993-he said: "Hopefully, we'll be more responsible in quicker fashion."

FAA officials say the agency's day-to-day operation addresses most issues "rather effectively," often detecting and remedying safety problems before accidents occur. Each morning, they say, the agency deploys about 3,000 inspectors and runs the busiest airspace in the world-without major incident on most days.

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"This is a formidable task," Hinson said.

The FAA "acknowledges that it can be reactive in some cases, but that can be a proper response in many cases," according to a statement by the agency in response to The Times.

"Reaction often means we insist on learning from past accidents. At other times, reaction may mean that we are properly responding to public demand or concern, which is proper in our democratic form of government."

Said Hinson: "If you look at the way the FAA deals with safety, about 95% of what we do . . . of what you or I would call preemptive safety efforts, those are efforts you probably never read about or write about.

"About 5% of what we do is after there is an incident or an accident."

Airplane manufacturers and airlines said safety comes first with both the FAA and them, and that they would never compromise the lives of the flying public. "We always want to try to make a good system better," said Joe Hopkins, spokesman for United Airlines.

A scheduled commercial airplane trip in the United States is regarded as among the safest forms of travel in the world. The odds of an air traveler dying in a crash are roughly the same as the odds of being killed by lightning, according to the National Safety Council.

The U.S airline industry had gone more than two years without a major accident before the string of fatal accidents this year. As of October, an estimated 843 people have died in plane crashes in 1994-one of the worst records since 1988, according to preliminary statistics by the NTSB, the agency that investigates accidents.

Now, NTSB sources say, investigators are exploring whether deficiencies in FAA oversight and operations may have been contributing factors in at least two of the three major accidents this year in Charlotte, N.C., Pittsburgh, Pa., and near Chicago.

After the FAA admitted in July that it may have mishandled reports on turbulence problems associated with Boeing 757 jetliners, The Times reviewed hundreds of airline crashes and thousands of government documents obtained under the **Freedom of Information** Act. Scores of past and present FAA officials, members of Congress, airline industry sources and safety experts were interviewed.

What emerged was a portrait of an agency that many times has been slow to address safety problems, particularly when they were controversial or costly to correct. Among the findings:

* The FAA's performance sometimes has been compromised by poor communication between those charged with identifying potential safety problems and those with the power to act on them, and pressure from an influential industry.

"Any time you want to change the rules, the manufacturers scream," said one FAA aircraft-certification official who spoke on condition of anonymity. "Anything that cost money to the manufacturers, we have to fight them on. They say: 'Well, there hasn't been an accident.' We say: 'Well, there could be.' "

* Deadly delays have occurred in part because a law requires the FAA to justify the cost of implementing proposed safety measures by showing that enough lives will be saved.

"It's strangulation of safety by regulatory process," observed Rep. James L. Oberstar (D-Minn.), chairman of the House Public Works and Transportation Committee's panel on aviation.

* The FAA failed to heed repeated admonitions from oversight agencies and from within its own ranks to make safety a higher priority. And there exists, both inside and outside the FAA, a tacit acceptance that sometimes only accidents can spur the agency to take meaningful action.

Charles O. Miller, former head of the NTSB's Bureau of Air Safety, said he has kept a file called "known precedents."

"I have been keeping it for awhile because I was getting disturbed about seeing accidents happen from causes I had seen before," he said.

Consider the case of runway safety.

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nation's busiest airports has fallen behind schedule and may not be completed until the turn of the century, according to the General Accounting Office.

"Something simmers on the back burner, and it doesn't get done," said Hugh E. Waterman, a former FAA manager who worked for the agency for 27 years before retiring in 1986. "But then, one governor or 60 regular human beings dies, then it goes onto the front burner."

*

Created in 1958, the FAA has a double-barreled task that critics believe is a conflicting one: to promote the aviation industry and to ensure safety.

The NTSB is charged with investigating the causes of transportation accidents and making safety recommendations. Created in 1974, it has no regulatory powers and cannot force the FAA to act. Historically, the NTSB has wielded its influence most successfully by publicly drawing attention to the FAA's lapses and leveraging legislative outrage.

The FAA points out that through the years it has identified numerous safety hazards and acted before accidents ever occurred. In a 20-page statement to The Times, FAA officials said the agency routinely detects safety problems but receives no credit because there is no way to tell how many accidents have been prevented.

"Airline safety is among the least recognized success stories in public or corporate policy in the United States," the FAA statement said. "Improvements in engine reliability, aircraft design, avionics, cockpit technology, navigational aids and air traffic control have made serious accidents rare events."

Although the FAA has adopted eight of every 10 safety recommendations made by the NTSB, the average amount of time it takes to implement the recommendations is slightly more than two years. In some cases, it's been much longer.

While he believes that the NTSB functions as a "great auditor" for the FAA, Hinson said the FAA sometimes respectfully disagrees with the safety board, and with good reason.

"I think it's probably OK to have disagreement on the 15% or so," Hinson said, referring to the number of safety recommendations the agency doesn't accept. "It's not just . . . 'We don't like them' and put them away. We have to defend our position.

"There are often cases in aviation where knowledgeable people can disagree."

The NTSB's Sweedler said the safety board was pleased with the "82.5% acceptance rate," but, he said, "there are quite a few important issues in the other 18%."

*

Records show a pattern of delay in correcting a number of problems:

* It took the FAA eight years to act on a problem with Cessna carburetors after John R. James, manager of the FAA's aircraft certification office in Atlanta, had written a memo warning: "CAUTION: there have been reports of power loss, severe in some cases."

The problem was causing planes to stall and crash. During that eight-year period, at least 10 accidents had occurred and half a dozen people had died.

* A year before the top half of a Boeing 737 ripped off over Hawaii in 1988 because of metal fatigue, FAA researcher Thomas Swift wrote a 77-page report saying fatigue in America's aging air fleet was a safety risk: "It is possible for a number of cracks, each not easily inspected, to suddenly join together and form a long critical crack. . . . A number of fleets are currently operating at double their initially anticipated design life goals."

* It took a decade of admonitions and at least four major crashes before the FAA acknowledged that certain planes, such as early model DC-9s and Fokker F-28s, were especially susceptible to control problems with minute amounts of ice on their wings.

Ten years after the NTSB had made safety recommendations following the deaths of 78 people in a 1982 Air Florida accident in Washington, a similar tragedy happened at La Guardia Airport in New York. That accident, involving USAir Flight 405, killed 27.

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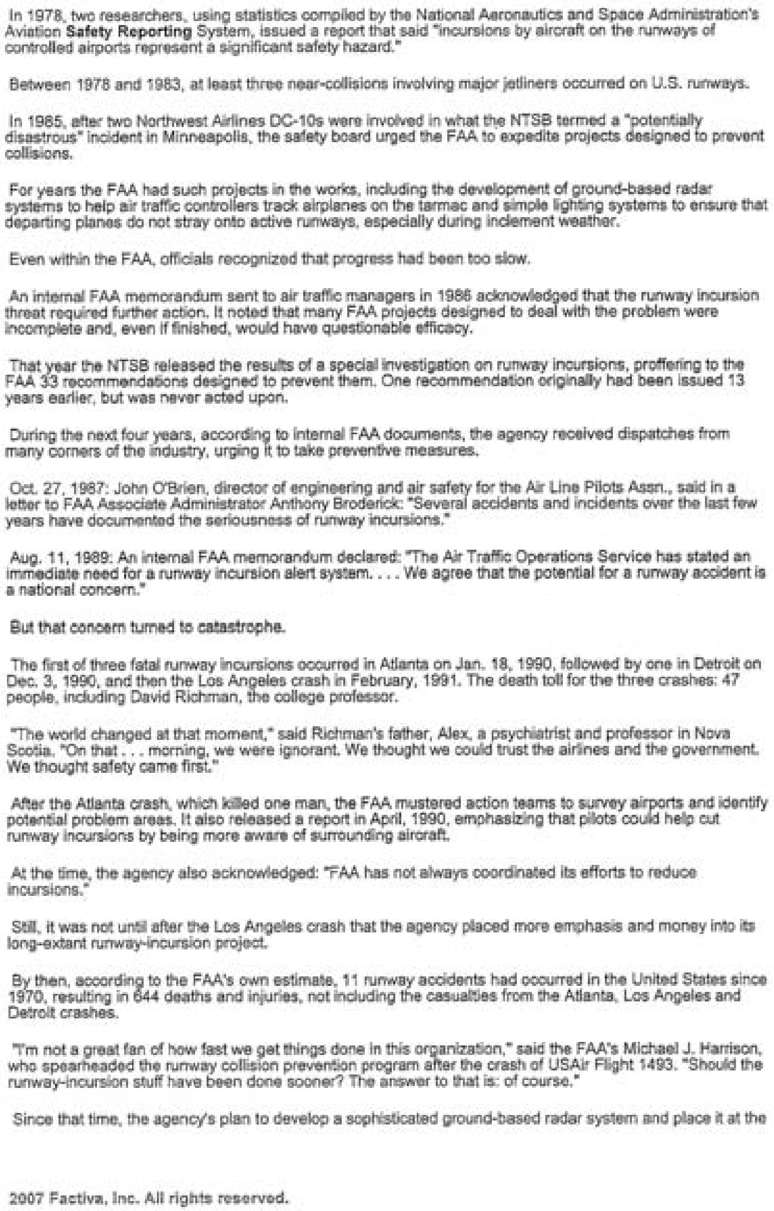

In 1978, two researchers, using statistics compiled by the National Aeronautics and Space Administration's Aviation **Safety Reporting** System, issued a report that said "incursions by aircraft on the runways of controlled airports represent a significant safety hazard."

Between 1978 and 1983, at least three near-collisions involving major jetliners occurred on U.S. runways.

In 1985, after two Northwest Airlines DC-10s were involved in what the NTSB termed a "potentially disastrous" incident in Minneapolis, the safety board urged the FAA to expedite projects designed to prevent collisions.

For years the FAA had such projects in the works, including the development of ground-based radar systems to help air traffic controllers track airplanes on the tarmac and simple lighting systems to ensure that departing planes do not stray onto active runways, especially during inclement weather.

Even within the FAA, officials recognized that progress had been too slow.

An internal FAA memorandum sent to air traffic managers in 1986 acknowledged that the runway incursion threat required further action. It noted that many FAA projects designed to deal with the problem were incomplete and, even if finished, would have questionable efficacy.

That year the NTSB released the results of a special investigation on runway incursions, proffering to the FAA 33 recommendations designed to prevent them. One recommendation originally had been issued 13 years earlier, but was never acted upon.

During the next four years, according to internal FAA documents, the agency received dispatches from many corners of the industry, urging it to take preventive measures.

Oct. 27, 1987: John O'Brien, director of engineering and air safety for the Air Line Pilots Assn., said in a letter to FAA Associate Administrator Anthony Broderick: "Several accidents and incidents over the last few years have documented the seriousness of runway incursions."

Aug. 11, 1989: An internal FAA memorandum declared: "The Air Traffic Operations Service has stated an immediate need for a runway incursion alert system. . . . We agree that the potential for a runway accident is a national concern."

But that concern turned to catastrophe.

The first of three fatal runway incursions occurred in Atlanta on Jan. 18, 1990, followed by one in Detroit on Dec. 3, 1990, and then the Los Angeles crash in February, 1991. The death toll for the three crashes: 47 people, including David Richman, the college professor.

"The world changed at that moment," said Richman's father, Alex, a psychiatrist and professor in Nova Scotia. "On that . . . morning, we were ignorant. We thought we could trust the airlines and the government. We thought safety came first."

After the Atlanta crash, which killed one man, the FAA mustered action teams to survey airports and identify potential problem areas. It also released a report in April, 1990, emphasizing that pilots could help cut runway incursions by being more aware of surrounding aircraft.

At the time, the agency also acknowledged: "FAA has not always coordinated its efforts to reduce incursions."

Still, it was not until after the Los Angeles crash that the agency placed more emphasis and money into its long-extant runway-incursion project.

By then, according to the FAA's own estimate, 11 runway accidents had occurred in the United States since 1970, resulting in 644 deaths and injuries, not including the casualties from the Atlanta, Los Angeles and Detroit crashes.

"I'm not a great fan of how fast we get things done in this organization," said the FAA's Michael J. Harrison, who spearheaded the runway collision prevention program after the crash of USAir Flight 1493. "Should the runway-incursion stuff have been done sooner? The answer to that is: of course."

Since that time, the agency's plan to develop a sophisticated ground-based radar system and place it at the

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Researched by JEFF BRAZIL and SHELBY GRAD / Los Angeles Times

How the Study Was Conducted

To complete this report, The Times reviewed roughly 20,000 pages of internal documents obtained from the Federal Aviation Administration through the **Freedom of Information** Act. The newspaper also reviewed a computer analysis of the causes of airplane crashes between 1983 and last July by the National Transportation Safety Board. The Times also studied dozens of reports by government oversight agencies, and interviewed scores of present and past FAA officials, airline industry sources, aviation safety experts, members of Congress, crash survivors and the families of crash victims.

PHOTO: COLOR, (Orange County Edition, A1) This USAir jet hit a commuter plane at LAX in 1991, killing 34 people, before runway safety was upgraded.; PHOTO: Investigators survey wreckage of USAir Boeing 737 the morning after the Feb. 1, 1991, deadly collision with a Skywest Metro plane at LAX. / MARSHA TREAGER GORMAN / Los Angeles Times; PHOTO: Alex Richman, father of David Richman, a victim of the runway crash of a jet in Los Angeles in 1991, says, "We thought safety came first." / JAMIE FRANCIS / For The Times; PHOTO: (Orange County Edition, A30) Wreckage of USAir jet at LAX. Many aboard died of smoke inhalation, 5 years after the FAA was advised of emergency-exit access problems. / JIM MENDENHALL / Los Angeles Times; PHOTO: David Hinson, FAA administrator; CHART: Runway Incursions / Los Angeles Times

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The Air Line Pilots Assn. said in a letter to the FAA at the time: "The lack of an adequate response to (the NTSB's earlier) recommendation (on de-icing wings), which was made approximately 9 years ago, contributed to the accident involving USAir Flight 405."

"The FAA," said veteran air safety investigator Rudolf Kapustin, "makes it sound like: `Hey, we've got a brand-new problem here.' Well, a lot of times it's not a new problem. It's an old problem."

Kapustin, who has worked for the FAA and the NTSB, was the lead investigator in the 1982 Air Florida crash, which was caused, in part, by ice on the wings. "After the Fokker accident (at La Guardia Airport in 1992), the FAA convened this worldwide conference on de-icing. They said: `Now you've got to put a ladder up and touch (the wing to see if it has ice on it).' Well, Jesus, we knew that years ago."

The FAA itself concluded last July that its ability to act upon safety concerns in a timely manner was lacking. The agency had launched an internal investigation after The Times reported that it had mishandled the Boeing 757 turbulence issue.

But the acknowledgment came as no surprise to air safety experts.

In 1988, then-FAA Administrator Allan McArtor, in an internal memorandum, acknowledged that the agency lacked an internal clearinghouse for safety data, and that management of safety data within the agency was disorganized.

A July, 1988, Office of Technology Assessment report concluded: "More stringent safety standards usually follow a widely publicized airline accident and vocal public and congressional concern than from FAA initiatives."

And last year, Robert E. Machol, the FAA's chief scientist before retiring last summer, pointed out the agency's shortcomings. In a March, 1993, memo, he detailed how the Boeing 757 wake-turbulence problem was handled. Before two crashes that claimed 13 lives, Machol had predicted that turbulence created by the jetliners would cause a "major crash" if the FAA failed to take preventive measures.

"This is symptomatic of a bigger problem, which is that we react very slowly to things where maybe we ought to act more rapidly," Machol wrote. "We need to be more alert to safety questions."

Next: Why delays in response occur.

Times researcher Sheila A. Kern and correspondent Shelby Grad contributed to this report.

The FAA Factor in Crashes

The Federal Aviation Administration is listed as a cause or factor in 93 plane crashes from1983 to July, 1994. Injury and fatality records for the 93 crashes show:

* 576 dead

* 151 seriously injured

* 270 moderately injured

An additional 10 crashes were attributed to errors by specific FAA employees, resulting in:

* Seven dead

* Eight moderately injured

Source: National Transportation Safety Board

Researched by JEFF BRAZIL and SHELBY GRAD / Los Angeles Times

Runway Incursions

From 1990 to 1993, the number of aircraft runway collisions has declined by one-third despite an increase in air traffic: '93: 188 Source: Federal Aviation Administration

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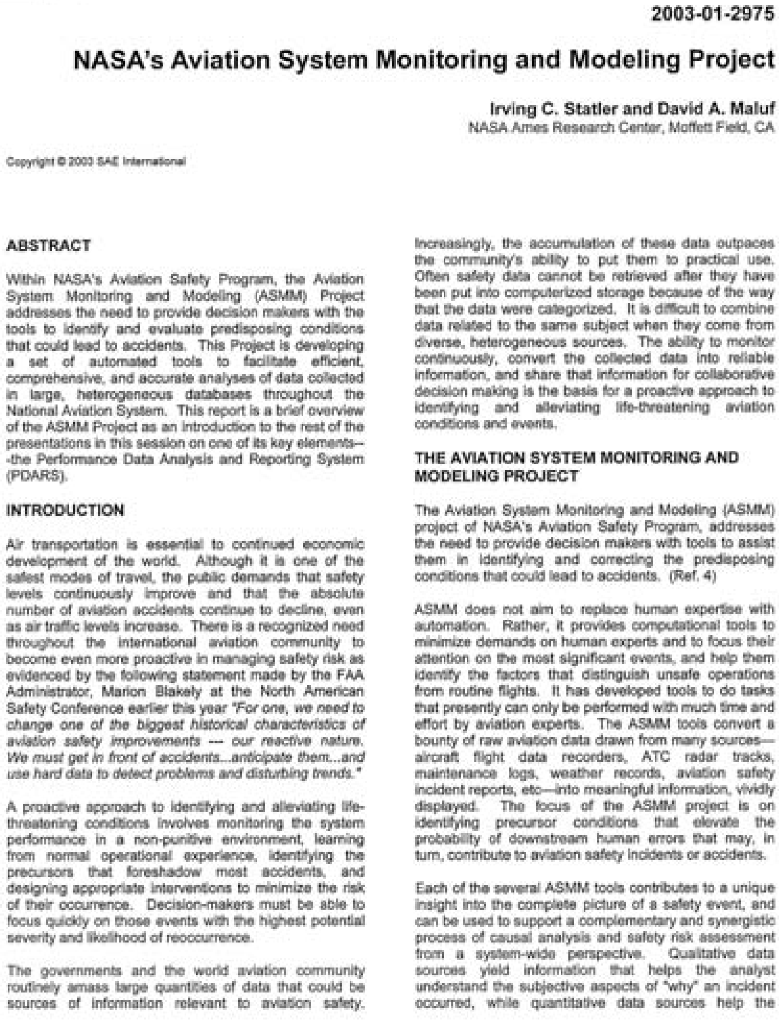
Exhibit #3



2003-01-2975

NASA's Aviation System Monitoring and Modeling Project

Irving C. Statler and David A. Maluf
NASA Ames Research Center, Moffett Field, CA

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ABSTRACT

Within NASA's Aviation Safety Program, the Aviation System Monitoring and Modeling (ASMM) Project addresses the need to provide decision makers with the tools to identify and evaluate predisposing conditions that could lead to accidents. This Project is developing a set of automated tools to facilitate efficient, comprehensive, and accurate analyses of data collected in large, heterogeneous databases throughout the National Aviation System. This report is a brief overview of the ASMM Project as an introduction to the rest of the presentations in this session on one of its key elements--the Performance Data Analysis and Reporting System (PDARS).

INTRODUCTION

Air transportation is essential to continued economic development of the world. Although it is one of the safest modes of travel, the public demands that safety levels continuously improve and that the absolute number of aviation accidents continue to decline, even as air traffic levels increase. There is a recognized need throughout the international aviation community to become even more proactive in managing safety risk as evidenced by the following statement made by the FAA Administrator, Marion Blakely at the North American Safety Conference earlier this year *"For one, we need to change one of the biggest historical characteristics of aviation safety improvements --- our reactive nature. We must get in front of accidents...anticipate them...and use hard data to detect problems and disturbing trends."*

A proactive approach to identifying and alleviating life-threatening conditions involves monitoring the system performance in a non-punitive environment, learning from normal operational experience, identifying the precursors that foreshadow most accidents, and designing appropriate interventions to minimize the risk of their occurrence. Decision-makers must be able to focus quickly on those events with the highest potential severity and likelihood of reoccurrence.

The governments and the world aviation community routinely amass large quantities of data that could be sources of information relevant to aviation safety. Increasingly, the accumulation of these data outpaces the community's ability to put them to practical use. Often safety data cannot be retrieved after they have been put into computerized storage because of the way that the data were categorized. It is difficult to combine data related to the same subject when they come from diverse, heterogeneous sources. The ability to monitor continuously, convert the collected data into reliable information, and share that information for collaborative decision making is the basis for a proactive approach to identifying and alleviating life-threatening aviation conditions and events.

THE AVIATION SYSTEM MONITORING AND MODELING PROJECT

The Aviation System Monitoring and Modeling (ASMM) project of NASA's Aviation Safety Program, addresses the need to provide decision makers with tools to assist them in identifying and correcting the predisposing conditions that could lead to accidents. (Ref. 4)

ASMM does not aim to replace human expertise with automation. Rather, it provides computational tools to minimize demands on human experts and to focus their attention on the most significant events, and help them identify the factors that distinguish unsafe operations from routine flights. It has developed tools to do tasks that presently can only be performed with much time and effort by aviation experts. The ASMM tools convert a bounty of raw aviation data drawn from many sources—aircraft flight data recorders, ATC radar tracks, maintenance logs, weather records, aviation safety incident reports, etc—into meaningful information, vividly displayed. The focus of the ASMM project is on identifying precursor conditions that elevate the probability of downstream human errors that may, in turn, contribute to aviation safety incidents or accidents.

Each of the several ASMM tools contributes to a unique insight into the complete picture of a safety event, and can be used to support a complementary and synergistic process of causal analysis and safety risk assessment from a system-wide perspective. Qualitative data sources yield information that helps the analyst understand the subjective aspects of "why" an incident occurred, while quantitative data sources help the analyst to understand the objective aspects of "what" happened.

MONITOR TO IDENTIFY SAFETY-RELATED EVENTS:

The first step in the proactive management of risk is to monitor the system continuously, and collect, codify, and classify safety incident data into repositories that can be subsequently mined for safety insights. The databases containing information relevant to aviation safety are very large, heterogeneous (textual and digital), diverse, distributed sources from which information must be extracted and merged to gain a complete picture of a situation. The information must be displayed in a way that makes it easy for the domain expert to interpret and to compare with expectations or performance standards., and to gain the insight needed to identify those events that present potential risks.

Some of the databases, such as the Aviation Safety Reporting System (ASRS) and National Transportation Safety Board (NTSB) databases deal with the national aviation system. Others archive data applicable to particular groups of users. Accordingly, the ASMM uses a dual monitoring strategy. It develops tools that help identify system-wide safety trends using existing and evolving system-level data resources (*extramural monitoring*), and it provides individual constituents of the NAS with tools that enable them to draw useful information from the data they gather (*intramural monitoring*).

Intramural Monitoring

The *Intramural Monitoring* element is intended to provide the air-service operators with the tools needed to monitor their own performance and safety continuously, effectively, and economically within their own organizations. The primary products of this activity are the Aviation Performance Measuring System (APMS) for processing flight-recorded data and the Performance Data Analysis and Reporting System (PDARS) for processing air traffic control data. The intent is to provide a suite of tools for converting data into information customized to the needs of each individual user, and, thereby, to encourage them to share their information for cooperative proactive decision making.

Intramural monitoring at the air carriers is addressed with the APMS that is the research to develop the methodologies and tools to demonstrate to US air carriers that very large quantities of flight-recorded data can be monitored, processed, and analyzed routinely, efficiently, economically, and usefully. The suite of integrated APMS tools is designed to convert flight-recorded data into information to the air-services provider for assuring the quality, reliability, and safety of performance of each company's own Flight Operations and Quality Assurance (FOQA) programs and Advanced Qualifications Programs (AQP). (Ref. 1 and 2) APMS tools go substantially beyond the capabilities of the current commercially available software programs that are mainly designed to count pre-defined exceedances. The APMS will assist an operator in understanding how its aircraft are being operated normally and routinely on the line. The flight-safety analyst will be able to identify atypical, statistically extreme, and safety-related events and trends to support safety and economic decisions.

Intramural monitoring at air traffic control is addressed with the NASA-FAA Performance Data Analysis and Reporting System (PDARS). PDARS is an ATC radar-track monitoring capability developed by NASA and the FAA that routinely collects, processes, and merges ATC data; computes quantitative performance measures; produces and disseminates daily performance-measurement reports, and archives basic operational data and performance statistics. PDARS performance measurements relate to system throughput, delays, system predictability, and other key ATC performance indicators. (Ref. 3) This project is being carried out in collaboration with the ATC community (FAA and NATCA) to obtain the users' evaluations and the identified informational needs of air traffic management.

Currently, the ATC facilities in three of the nine FAA-ATC regions plus the Command Control Center are participating in the test and evaluation of PDARS. This constitutes about thirty facilities connected to the PDARS network and receiving reports each morning about the previous day's operations that are customized to the needs of each facility. By agreement among the facilities, these reports are shared.

NASA is responsible for the implementation and maintenance of the secure, dedicated network over which PDARS reports are distributed and shared among facilities. The PDARS network provides for collecting data from each ATC site, transmitting them to the central site for processing, and delivering the results of the processed data to ATC managers at each of the sites for evaluation. (Figure 1).

The functional requirements of the FAA customers on PDARSnet focus on the need to maintain a secure and reliable path to each of the data centers, while maintaining the flexibility for future upgrades and additional sites. PDARSnet includes a two-tiered approach: the physical/logical connectivity between sites and the security mechanisms required by the proprietary nature of the ATC data. The PDARS wide-area network (WAN) connectivity requirements are met with Cisco 2524/2621 routers at each location on multiple frame relay cloud. The Frame Relay technology is a reliable cost-effective solution that also offers the benefit of logical point-to-point connectivity and bandwidth upgrades without the need to install additional equipment. PDARSnet has a Committed Information Rate (CIR) of 384 kilobytes/second between remote sites and the central processing site, guarantees availability of service at 99.8%, and maximum time to restore service is no more than 4 hours.

Security is a prime concern for this network. Therefore, many precautions are taken to ensure data confidentiality. These include the physical and logical isolation of this network from all other networks (including the internet), central management of WAN security policies and procedures, and strict enforcement of access from site LAN to PDARSnet resources. Data flow is subjected to security filters that (1) are implemented on the leaf site routers, (2) operate on source and destination addresses, and (3) act as access lists to allow only approved customer networks to traverse the PDARSnet.

At each FAA site, NASA provides, operates, and maintains the router to tap into the PDARSnet. One LAN access port is provided for each leaf site. The router password is restricted to PDARS operations. The demarcation of responsibility for the PDARSnet is at the LAN port on the router at the local site. FAA is responsible for all resolutions that extend beyond this demarcation within the site.

The PDARSnet is currently a full production network connecting about thirty sites and is expanding.

Extramural Monitoring

The *Extramural Monitoring* element complements *Intramural Monitoring* and provides a comprehensive mechanism for monitoring the performance and safety of the overall National Aviation System and for detecting and evaluating the effects of new technologies as they are inserted into the system. *Extramural Monitoring* is the "top-down" element of the dual strategy for monitoring. The primary product of this activity is the National Aviation System Operational Monitoring Service (NAOMS).

NAOMS is a comprehensive and coherent survey of the operators of the aviation system (i.e., its pilots, controllers, mechanics, dispatchers, flight attendants, and others) on a regular basis. There is proven value in viewing the aviation system through the eyes of its operators. NAOMS is a longitudinal survey that will track safety trends, monitor the impact of technological and procedural changes to the NAS, and contribute to the development of a data-driven basis for safety decisions.

The concepts and capabilities of the two approaches (i.e., top-down extramural monitoring and bottom-up intramural monitoring) have evolved independently in parallel. However, information derived from each will complement the other as well as the other elements of ASMM in the process of identifying precursors, monitoring the effects of changes, and developing predictive capability.

EVALUATE THE OPERATIONAL SIGNIFICANCE

The second step in the cycle of proactive management of risk is to evaluate the operational significance of the incident or event that was identified. Decision-makers must be able to focus quickly on those events with the highest potential for severe consequences and likelihood of reoccurrence. This evaluation requires an understanding of the contextual factors and conditions that were conducive to the identified incident so that the domain expert can ascertain the likelihood of future occurrences and assess the severity of potential consequences.

The element of the ASMM Project called *Data Analysis Tools Development* is developing a set of automated tools to facilitate efficient, comprehensive, and accurate analyses of data collected from large, heterogeneous data sources throughout the National Aviation System. These new technologies extract information from and establish meaningful linkages among both qualitative (i.e., textual) and quantitative (i.e., digital) databases, and provide visualizations of significant patterns and trends.

Information must be extracted from qualitative data sources to help the domain expert understand the subjective aspects of "why" an incident occurred, and from quantitative data sources to understand the objective aspects of "what" happened. Therefore, automated capabilities are being developed to process both textual and numeric aviation data, and to extract relevant information from diverse databases; including those derived from the activities under *Intramural* and *Extramural Monitoring*. The results of the searches of heterogeneous databases are presented in displays of meaningful information that help the analysts achieve the insight needed to understand the circumstances, focus their attention on operationally significant events, and propose mitigating actions.

Each of the tools developed are being tested and evaluated by our partners in the operational environment under *Intramural* and *Extramural Monitoring*.

The work being carried out under the element called *Modeling and Simulations* is described in the next section as it relates to the formulation of an intervention. However, fast-time simulations are also used to **Evaluate** an identified event by helping the analyst explore for its contextual factors that are conducive to failure and human error, gain insight into the operational significance of the event, and assess its potential consequences.

FORMULATE AN INTERVENTION

Having identified an operationally significant event and understood its contextual factors, the next step in the process of proactive management of risk is to formulate an intervention. It is up to the experts in industry and the FAA to **Formulate** and to **Implement** the interventions. However, an objective of the element of ASMM called *Modeling and Simulations* is to aid the decision makers in these two steps of the process.

Modeling and Simulations uses models of the NAS at a level of detail sufficient to track key safety characteristics for reliable prediction of the system-wide effects of new technologies and procedures on operations and communications. Models incorporate human performance into existing NAS modeling tools and are being validated with data obtained from *Intramural* and *Extramural Monitoring*. Techniques have been developed for representing multi-operators interacting in complex dynamic scenarios.

Fast-time simulations serve as a computational test bed for analyzing system performance, including the contributions of individual operators, individual elements of the system, the interactions among multiple agents, technologies, and large-scale system flow and control issues. Fast-time system-wide simulations enable the safety analyst to answer questions like *"Does the solution have any secondary, propagated or side effects?"* and *"Does the solution provide for graceful degradation in unanticipated operation anomalies?"* and *"Does the proposed intervention address the right question and in the right way based on an understanding of the joint cognitive system?"*

The assessment of safety risk is currently a post hoc analysis by the human expert of the statistical results of the fast-time Monte Carlo simulations. However, analytical tools are being developed in parallel with the fast-time simulations to assist the analysts in identifying the significant contextual factors of an event and in assessing the safety risks.

IMPLEMENT THE INTERVENTION

Implementation of an intervention for an identified problem is accomplished via prototypes, their effectiveness is evaluated, refinements are implemented, and then full-scale deployments are facilitated.

The step that is often missing from the cycle of proactive management of risk is that of having in place a system for monitoring in order to assess the effectiveness of the intervention measured against expectations. This is comparable to the first step in the proactive-management process called **Monitor to Identify** and closes the loop on the cycle. This step requires that those data that are needed to evaluate the intervention are appropriately collected, codified, and classified for retrospective search. The monitoring system should have been in place before the intervention to gather the baseline data for comparison of the before to the after. Once again, the relevant information in large heterogeneous, distributed databases need to be merged to gain a complete picture of the system-wide situation. All of the ASMM tools are applicable to facilitate efficient and insightful analyses of all relevant information.

IN SUM...

The ability to monitor continuously, convert the collected data into reliable information, and share that information among the stakeholders for collaborative decision making is the basis for a revolutionary, proactive approach to managing the aviation system for prevention of accidents.

The four sub-elements of ASMM (*Extramural Monitoring, Intramural Monitoring, Data Analysis Tools Development*, and *Modeling and Simulations*) are interdependent and interrelated. ASMM will merge the products of these four elements into a system-wide frame work enabling collaboration in aviation safety-risk management by policy makers whether they are in government or industry by sharing information while respecting the proprietary rights to some sources of data and sensitivities to potential misuse should they be released outside the owning organization.

Each of the ASMM Products such as APMS, PDARS, and NAOMS has stand-alone capabilities that will continue to evolve as the Data Analysis Tools are adapted to meet the evolving needs of the constituencies. However, the true and overriding value of the ASMM Products is as an integrated suite of tools to enable the achievement of a system-wide perspective on proactive management of the safety risk of the NAS.

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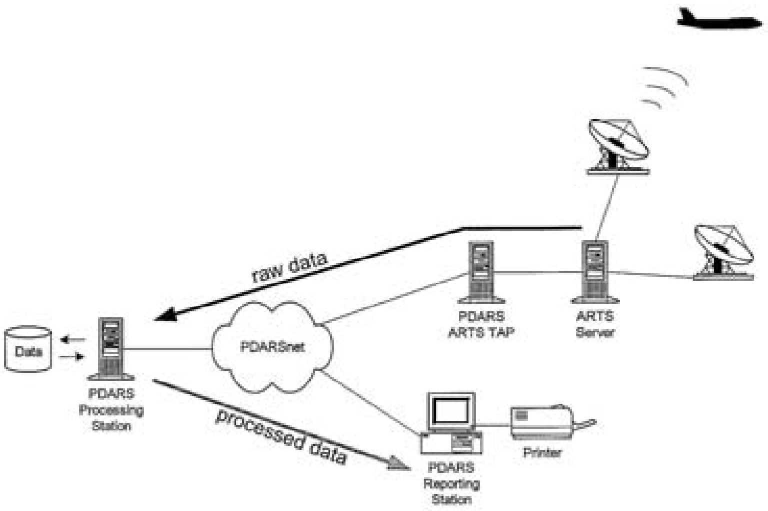
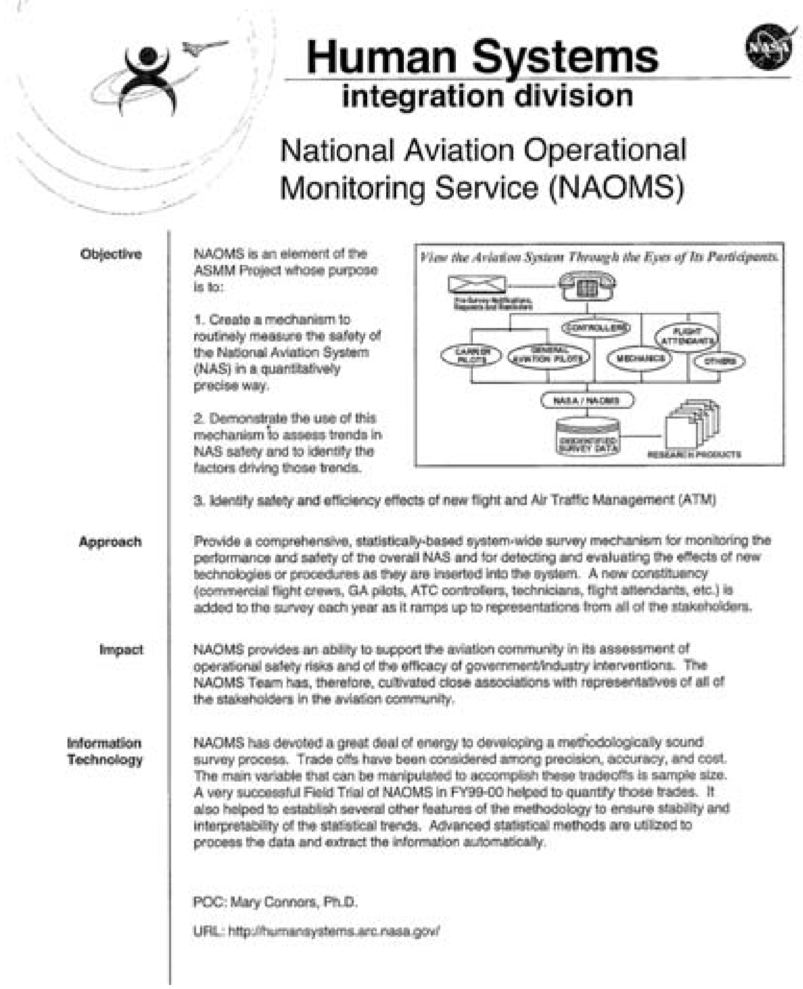


Figure 1 – PDARSnet Application Data Flow

Exhibit #4



View the Aviation System Through the Eyes of Its Participants.
CONTROLLERS
FLIGHT ATTENDANTS
CARRIER PILOTS
GENERAL AVIATION PILOTS
MECHANICS
OTHERS
NASA / NAOMS
DEIDENTIFIED SURVEY DATA
RESEARCH PRODUCTS

Human Systems
integration division

National Aviation Operational Monitoring Service (NAOMS)

Objective

NAOMS is an element of the ASMM Project whose purpose is to:

1. Create a mechanism to routinely measure the safety of the National Aviation System (NAS) in a quantitatively precise way.

2. Demonstrate the use of this mechanism to assess trends in NAS safety and to identify the factors driving those trends.

3. Identify safety and efficiency effects of new flight and Air Traffic Management (ATM)

Approach

Provide a comprehensive, statistically-based system-wide survey mechanism for monitoring the performance and safety of the overall NAS and for detecting and evaluating the effects of new technologies or procedures as they are inserted into the system. A new constituency (commercial flight crews, GA pilots, ATC controllers, technicians, flight attendants, etc.) is added to the survey each year as it ramps up to representations from all of the stakeholders.

Impact

NAOMS provides an ability to support the aviation community in its assessment of operational safety risks and of the efficacy of government/industry interventions. The NAOMS Team has, therefore, cultivated close associations with representatives of all of the stakeholders in the aviation community.

Information Technology

NAOMS has devoted a great deal of energy to developing a methodologically sound survey process. Trade offs have been considered among precision, accuracy, and cost. The main variable that can be manipulated to accomplish these tradeoffs is sample size. A very successful Field Trial of NAOMS in FY99-00 helped to quantify those trades. It also helped to establish several other features of the methodology to ensure stability and interpretability of the statistical trends. Advanced statistical methods are utilized to process the data and extract the information automatically.

POC: Mary Connors, Ph.D.

URL: http://humansystems.arc.nasa.gov/

Exhibit #5

Workshop on the Concept of the

NATIONAL AVIATION OPERATIONAL MONITORING SERVICE

(NAOMS)

May 11, 1999

WELCOME AND NAOMS INTRODUCTION

Linda Connell

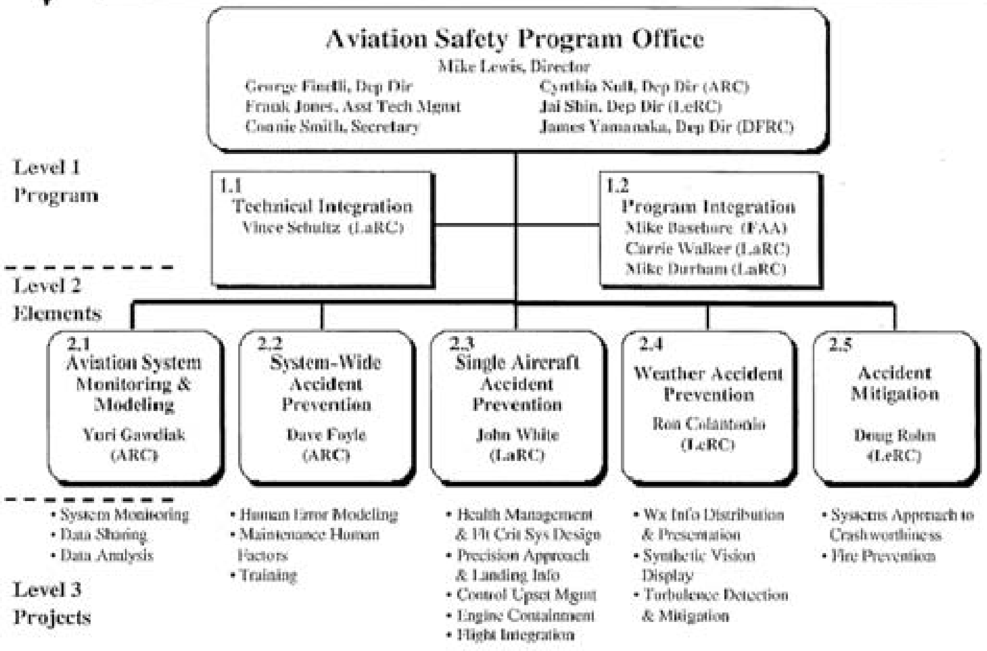
NASA Project Manager, Level III

Background

- **White House Commission on Aviation Safety and Security (Gore Commission)**
  - Called for 80% reduction in fatal accidents in 10 years
  - Encouraged NASA to actively participate
- **In 1998, NASA initiated a multi-year aviation safety program to support the Commission goal**
- **Focused Aviation Safety Program (AvSP)**
  - Formally begins FY00
- **NASA Aviation Operations Systems (AOS)**
  - Has supported ramp up activities in FY98 and FY99

AvSP Organization

Aviation Safety Program



Aviation Safety Program Office

Mike Lewis, Director

George Finelli, Dep Dir

Frank Jones, Asst Tech Mgmt

Connie Smith, Secretary

Cynthia Null, Dep Dir (ARC)

Jai Shin, Dep Dir (LeRC)

James Yamanaka, Dep Dir (DFRC)

Level 1 Program

1.1 Technical Integration

Vince Schultz (LaRC)

1.2 Program Integration

Mike Basehore (FAA)

Carrie Walker (LaRC)

Mike Durham (LaRC)

Level 2 Elements

2.1 **Aviation System Monitoring & Modeling**

Yuri Gawdiak (ARC)

2.2 **System-Wide Accident Prevention**

Dave Foyle (ARC)

2.3 **Single Aircraft Accident Prevention**

John White (LaRC)

2.4 **Weather Accident Prevention**

Ron Colantonio (LeRC)

2.5 **Accident Mitigation**

Doug Rohn (LeRC)

Level 3 Projects

- System Monitoring
- Data Sharing
- Data Analysis

- Human Error Modeling
- Maintenance Human Factors
- Training

- Health Management & Flt Crit Sys Design
- Precision Approach & Landing Info
- Control Upset Mgmt
- Engine Containment
- Flight Integration

- Wx Info Distribution & Presentation
- Synthetic Vision Display
- Turbulence Detection & Mitigation

- Systems Approach to Crashworthiness
- Fire Prevention

NASA Aviation Safety Program
Opportunities and Challenges

- Opportunity: to intensify national efforts to maintain our nations outstanding aviation safety record
- Challenge: to maintain this record as traffic grows in coming years

We need to be able to accurately measure progress towards the goal stated by the Gore Commission

Measurement Objectives

- **Better, more comprehensive numbers to**
  - Measure progress towards the safety improvement goal
- **Better and more rapid feedback on technological and procedural change**
  - Measure the effects of AvSP and related technologies as they are introduced to the aviation system
- **Escape from event-driven safety policy**
  - The accident *du jour* response syndrome
  - By giving policy makers a more secure sense of the safety state of the national aviation system
- **Create a data-driven basis for safety decisions**

Existing Capabilities

- **A number of valuable publicly available data collection programs already exist**
  - SDR / OpError / AIDS
  - ASRS
  - NTSB database
  - And others
- **These data collection efforts satisfy many needs**
- **But they do not provide**
  - An adequate top down view of long-term NAS safety trends
  - An effective means of measuring the impacts of new aviation technologies and procedures

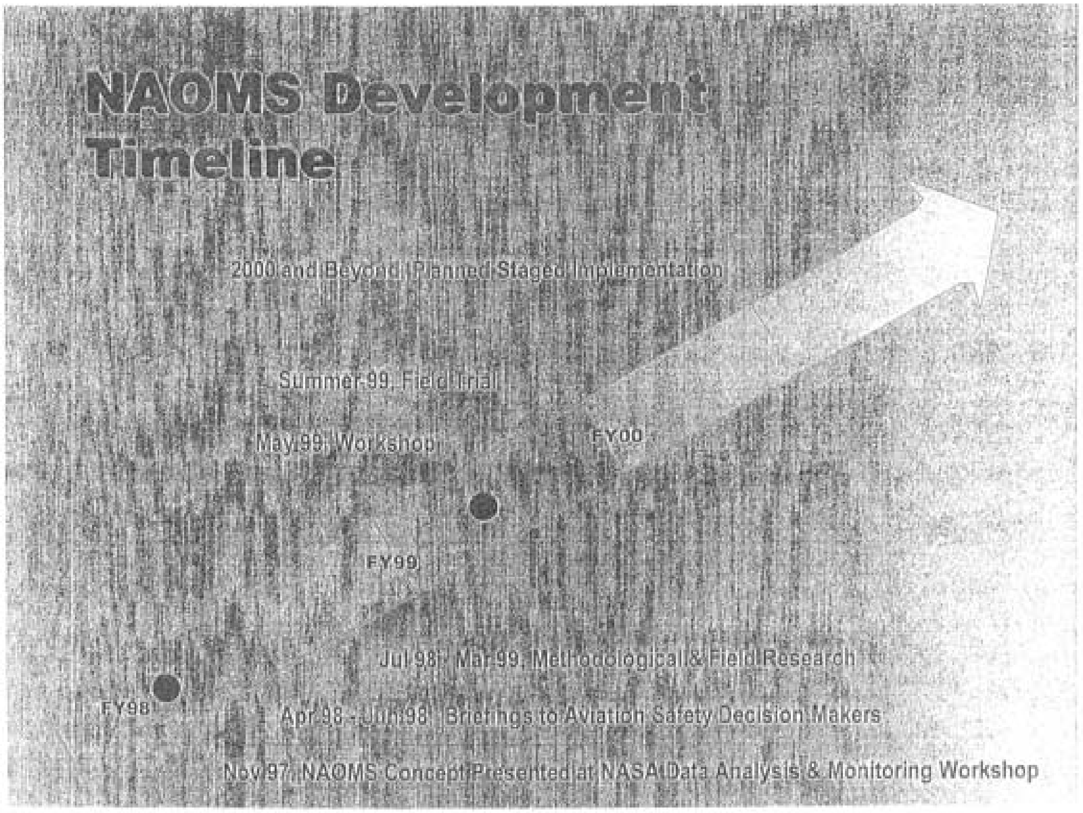
Existing Capabilities

- **A number of valuable publicly available data collection programs already exist**
  - SDR / OpError / AIDS
  - ASRS
  - NTSB database
  - And others
- **These data collection efforts satisfy many needs**
- **But they do not provide**
  - An adequate top down view of long-term NAS safety trends
  - An effective means of measuring the impacts of new aviation technologies and procedures

Proposed Benefit

Create a new capability that will track aviation safety trends while monitoring the impacts of technological and procedural changes to the aviation system

NAOMS Development Timeline



2000 and Beyond: Planned Staged Implementation

Summer 99: Field Trial

May 99: Workshop

Jul 98 - Mar 99: Methodological & Field Research

Apr 98 - Jun 98: Briefings to Aviation Safety Decision Makers

Nov 97: NAOMS Concept Presented at NASA Data Analysis & Monitoring Workshop

Exhibit #6

NAOMS Workshop

NATIONAL
AVIATION
OPERATIONS
MONITORING
SERVICE
(NAOMS)

March 1, 2000

NAOMS
CONCEPT, RATIONALE and FIELD TRIAL DEVELOPMENT

Robert Dodd Sc.D., M.S.
Principal Investigator,
Battelle

NAOMS Goals

Create a new capability that will:

1) Track aviation safety trends
2) Monitor the impacts of technological and procedural changes to the aviation system

NAOMS: Filling Important Data Gaps

- **NAOMS will not replace or duplicate current data collection efforts**
- **Designed to supplement current and future aviation safety data collection and analysis programs**
- **Will obtain accurate information from operational personnel**
    - Includes groups who traditionally have not been active sources of safety information

NAOMS Approach

- **Regularly survey pilots, controllers, mechanics, flight attendants and others who operate the national aviation system (NAS)**
  - View the national aviation system through their eyes
  - Includes all types of operations (air carrier, regional, corporate, general aviation, military)
- **Achieve scientific integrity by using well crafted survey instruments and carefully designed statistical sampling methods**

NAOMS
Will Collect Data on

Participant Experiences involving . . .

- ☆ **Aviation Operations (exposure)**
  - Flight hours / legs
  - Time on control position
  - Other pertinent measures
- 🕒 **Safety Events**
  - A standard set of benchmark incidents
- 🕒 **New Technologies and Procedures**
  - First-hand experiences
  - Continuously refocused in response to changing needs

NAOMS
Will Generate . . .

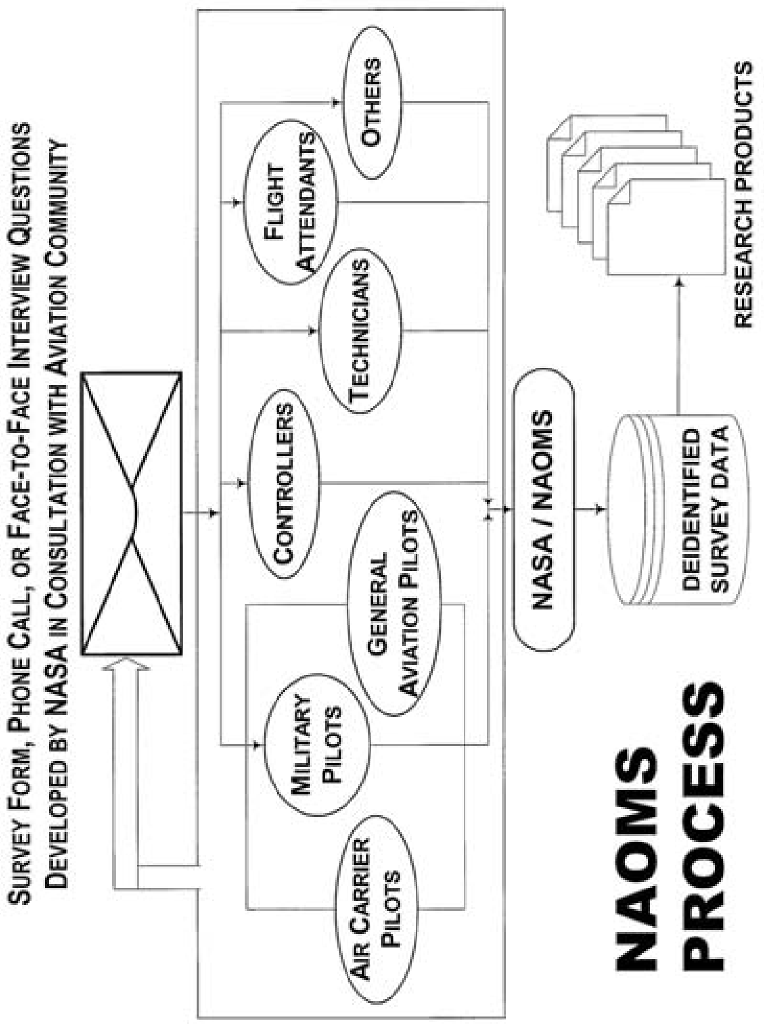
Statistically valid estimates of the actual rates of safety events and related experiences occurring in the NAS

NAOMS Data Use

- **Used to track event trends**
  - Will identify incident trends
  - May not fully explain trends or causal factors
  - Additional investigation may be needed
  - NAOMS will complement, not replace existing data resources
- **Can provide detailed insight into topics of special interest**
  - Added to the questionnaire as needed
  - Can be accomplished relatively quickly

Why NAOMS Chose the Survey Method

- **Proven in other venues**
  - Public health
  - Public policy
  - Market research
- **Scientific and representative**
- **Capable of addressing human performance issues**
- **Timely data collection**
- **Well-developed methodologies**


SURVEY FORM, PHONE CALL, OR FACE-TO-FACE INTERVIEW QUESTIONS
DEVELOPED BY NASA IN CONSULTATION WITH AVIATION COMMUNITY
AIR CARRIER PILOTS
MILITARY PILOTS
GENERAL AVIATION PILOTS
CONTROLLERS
TECHNICIANS
FLIGHT ATTENDANTS
OTHERS
NASA / NAOMS
DEIDENTIFIED SURVEY DATA
RESEARCH PRODUCTS
NAOMS PROCESS

Participant Confidentiality is Assured

- We will have no means of tracing a survey response to the individual who provided it
- All tracking information is kept separate and destroyed after use
- No information is collected on operator name or airport name
- Reports and data sets will have no information that can be used to identify reporters

NAOMS
Will Collect Data on

***Participant Experiences** involving . . .*

☆ **Aviation Operations (exposure)**
  - Flight hours / legs
  - Time on control position
  - Other pertinent measures

🕐 **Safety Events**
  - A standard set of benchmark incidents

🕐 **New Technologies and Procedures**
  - First-hand experiences
  - Continuously refocused in response to changing needs

NAOMS Products

- **EXPECTED OUTPUTS**
  - Summarized aviation operational experience data
  - Statistically reliable estimates of incident rates
  - Near real-time feedback on impacts of new technology and procedures
- **PRODUCT CONSUMERS**
  - Decision makers (government and industry)
  - Safety professionals and research organizations

NAOMS: Field Trial Goals

- **Determine Feasibility of Concept**
  - Can survey research techniques provide meaningful levels of reporting on safety events from the aviation community?
  - If so, is this level of reporting sufficient for trending?
- **Thorough and comprehensive evaluation of survey methodology**
  - Based on solid science and the best knowledge on survey methodology
    - Mode, recall period, etc
    - Sample size requirements and costs

Field Trial Focus

Methodology:
NOT EVENTS

No event information will be presented or published from the field trial.

Activities to Date

- **Feasibility Assessment**
  - Background Research
    - Literature review
    - Participant group profiles
  - Field Research
    - Conducted multiple focus groups with pilots
      - Obtained extensive listing of safety experiences
      - Solicited input on their likely response to a NAOMS survey
    - Conducted individual evaluation of pilot respondents
      - Ability to recall events
      - Method of categorizing events
  - Briefed Government and Industry Organizations

Activities to Date (cont'd)

- **NASA Workshops**
  - November 97 and May 1999
  - Government, Industry and Academia
- **Survey Instrument Development**
  - Drafts Developed, Extensive Review
    - Focus groups
    - ASRS analysts
    - Workshop comments

Field Trial Survey Instrument Structure

- Section A: Operational Exposure
- Section B: Safety Event Experiences
- Section C: Focus Topics
- Section D: Participant Feedback

Field Trial Approach

- **Assessment of the survey instrument and procedures**
  - Limited to air carrier pilots
  - Various versions were tested
  - Last section of survey asked participants for feedback on survey and process
- **Variations**
  - Mode (telephone, mail, face-to-face)
  - Recall period
  - Section order
  - Topical foci

NAOMS Field Trial Products

- **Response rates, quality and completeness by**
  - Mode
  - Recall period
  - Question order
- **Feedback on survey from respondents**
- **Dimensions of a fully operational system**
  - Sample size requirements
  - Mode
  - Recall period
  - Cost

BASIC FINDINGS

- **NAOMS is a *very viable* method to collect aviation safety data**
- **Response to survey very positive**
  - Very high response rates
- **The results indicate the most effective and efficient way to apply the survey is via telephone interviewing**
  - 10 to 20% more expensive than mail but roughly comp….;
    - better response rate
    - better accuracy
    - better question completion
  - Most common method for other surveys

Exhibit #7

NAOMS
NATIONAL AVIATION OPERATIONS
MONITORING SERVICE

The National Aviation Operations Monitoring Service

Future Directions

Dr. Mary Connors and Linda Connell

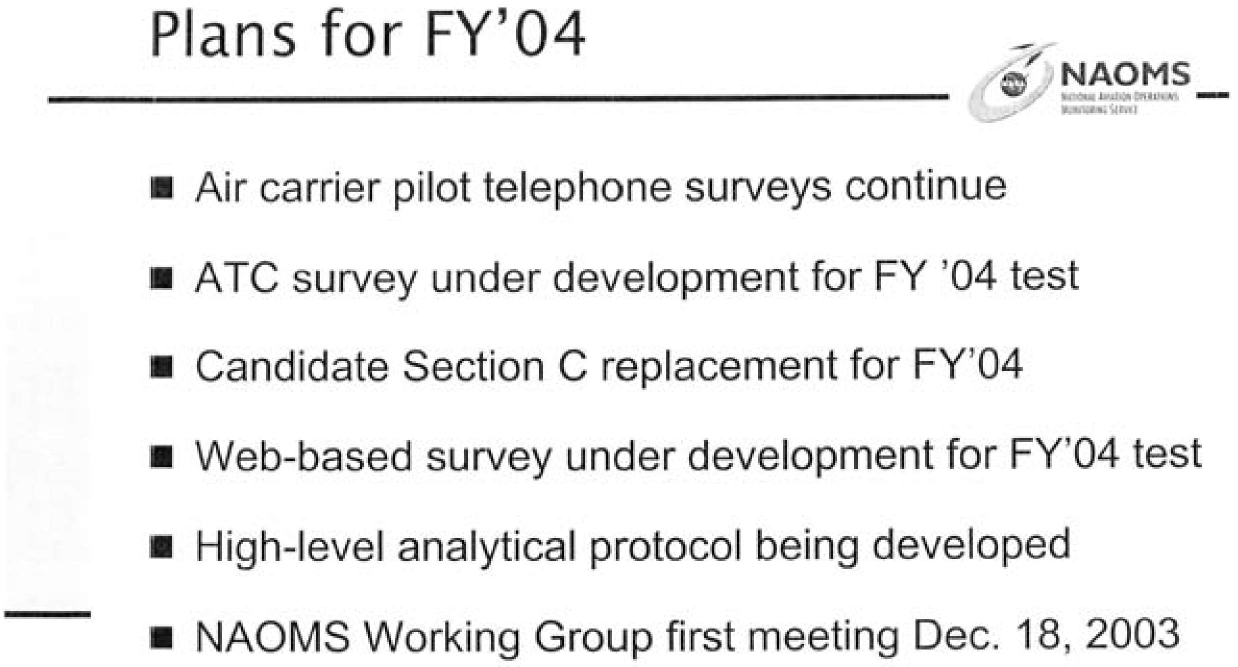
NASA

NAOMS Working Group

NAOMS

- The release of NAOMS data, and its future directions, will be guided by the Working Group
- NAOMS data do not stand by themselves; they need to be used in conjunction with other stakeholder data/research
- Ultimate value of NAOMS data depends on government/industry acceptance and use by stakeholders

Future data products will rely on guidance from the NAOMS working group



Plans for FY'04

- Air carrier pilot telephone surveys continue
- ATC survey under development for FY '04 test
- Candidate Section C replacement for FY'04
- Web-based survey under development for FY'04 test
- High-level analytical protocol being developed
- NAOMS Working Group first meeting Dec. 18, 2003

Exhibit #8

NATIONAL AVIATION OPERATIONS MONITORING SERVICE

(NAOMS)

NAOMS
NATIONAL AVIATION OPERATIONS
MONITORING SERVICE

Presentation to FAA, Washington, DC
April 9, 2003

Purpose

- **A number of databases attempt to capture safety-related information concerning National Airspace System, e.g.**
  - NTSB Accident/Incident Database
  - FAA Data System (NAIMS)
  - Aviation Safety Reporting System (ASRS)
- **A number of databases attempt to capture safety-related information concerning specific parts of the NAS, e.g.**
  - FOQA
  - PDARS
  - ASAP
- **No existing database addresses the health and safety of the NAS as a whole in a quantitatively defensible fashion.**

Goal

To create a new national capability that will quantitatively:

1. Track aviation safety trends
2. Monitor the impacts of technological and procedural changes to the aviation system
3. Contribute to the development of a data-driven basis for safety decisions.

Gov't and Industry Groups Briefed

- FAA
- HAI
- GAMA
- AOPA
- ALPA
- CAST
- NATCA
- NATA
- Boeing
- NBAA
- SWAPA
- ASRS Advisory Subcommittee

NAOMS field study briefing 3/1/00, D.C., 75 attendees

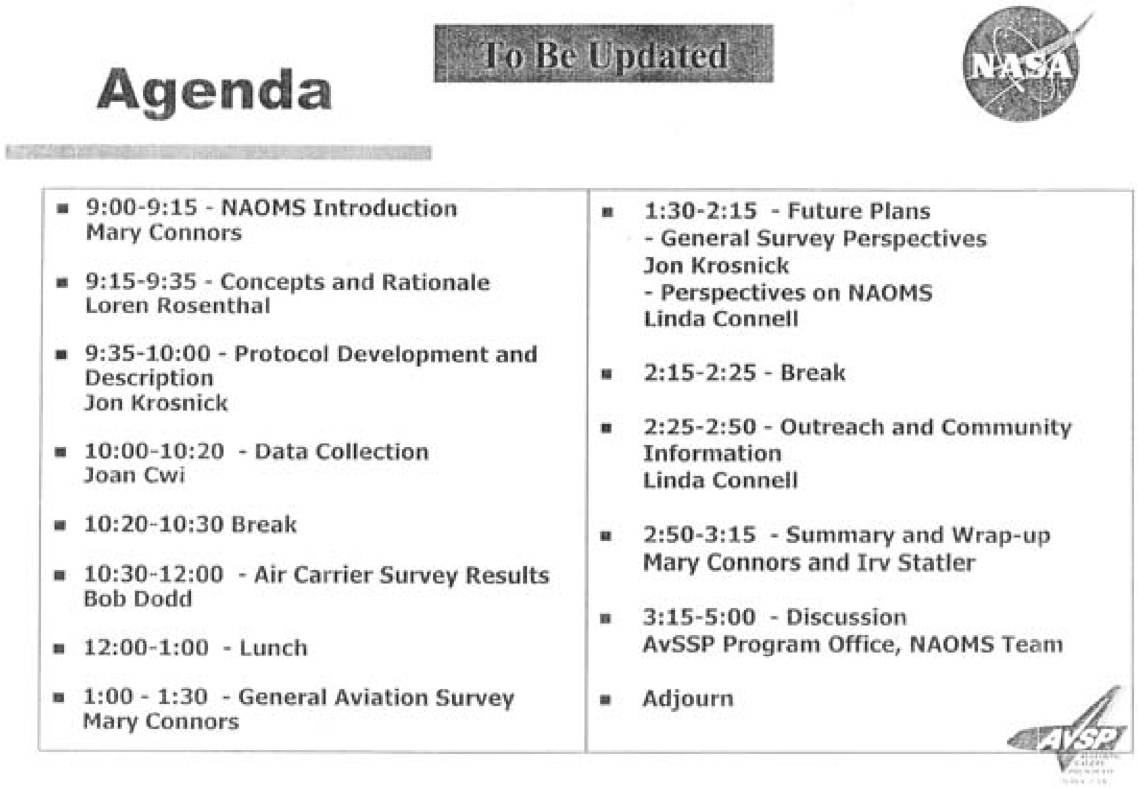
NAOMS Team

NASA Managers

– **Linda Connell**	**AvSP, Level 3**
– **Mary Connors**	**AvSP, Level 3**

Battelle Support Service Contract to NASA

– **Loren Rosenthal**	**Battelle Manager**
– **Robert Dodd**	**Principal Investigator**
– **Jon Krosnick**	**Survey Methodologist**
– **Joan Cwi**	**Survey Application**
– **T. Ferryman**	**Statistician**
– **Mike Silver**	**Survey Methodologist**
– **Mike Jobanek**	**Aviation Safety Analyst**



Agenda

To Be Updated

- 9:00-9:15 - NAOMS Introduction
  Mary Connors
- 9:15-9:35 - Concepts and Rationale
  Loren Rosenthal
- 9:35-10:00 - Protocol Development and Description
  Jon Krosnick
- 10:00-10:20 - Data Collection
  Joan Cwi
- 10:20-10:30 Break
- 10:30-12:00 - Air Carrier Survey Results
  Bob Dodd
- 12:00-1:00 - Lunch
- 1:00 - 1:30 - General Aviation Survey
  Mary Connors
- 1:30-2:15 - Future Plans
  - General Survey Perspectives
  Jon Krosnick
  - Perspectives on NAOMS
  Linda Connell
- 2:15-2:25 - Break
- 2:25-2:50 - Outreach and Community Information
  Linda Connell
- 2:50-3:15 - Summary and Wrap-up
  Mary Connors and Irv Statler
- 3:15-5:00 - Discussion
  AvSSP Program Office, NAOMS Team
- Adjourn

CONCEPTS and RATIONALE

Loren Rosenthal

The Unmet Data Need

- **Reliable, stable numbers with system-wide scope**
  - To inform policy decisions
  - And, investment decisions
- **Providing better and more rapid feedback on system change**
  - Technological and procedural
- **Facilitating a truly data-driven basis for safety decisions**
  - An escape from the accident *du jour* policy-making syndrome

After examining various possibilities, it was decided that a survey approach could best meet the unmet requirements

AvSP

Features of the Survey Method

- Human-centered
- Quantitative
- Flexible (versatile, topical)
- Comprehensive
- Well developed methodology
- Statistically accurate
- Stable

Users of Survey Research

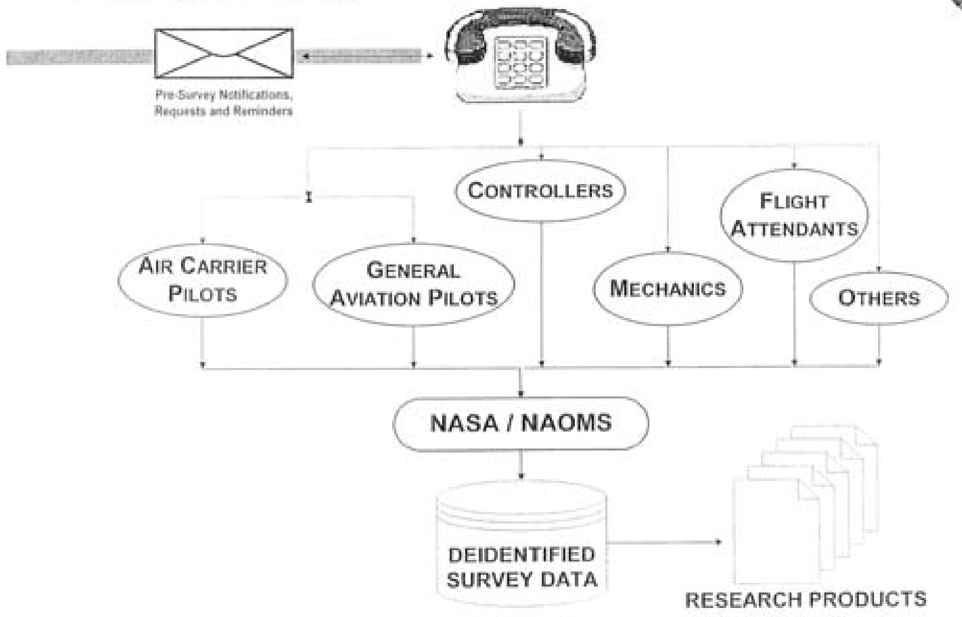
The advantages of the survey method have been demonstrated by its wide use in:

- Federal, State, and Local Government
- Academia
- Federal and State Courts
- Consumer Research

NAOMS Survey Approach

- Regularly survey pilots, controllers, mechanics, flight attendants and others who operate the national aviation system (NAS)
  - View the national aviation system through their eyes
  - Includes all types of operations (air carrier, regional, corporate, general aviation)
- Collect data on respondents events (as operationally experienced)
- Guarantee confidentiality of data
- Normalize for risk exposure (hours, legs, etc.)
- Achieve scientific integrity by using well crafted survey instruments and statistical analysis methods

NAOMS PROCESS



Pre-Survey Notifications, Requests and Reminders

AIR CARRIER PILOTS

GENERAL AVIATION PILOTS

CONTROLLERS

MECHANICS

FLIGHT ATTENDANTS

OTHERS

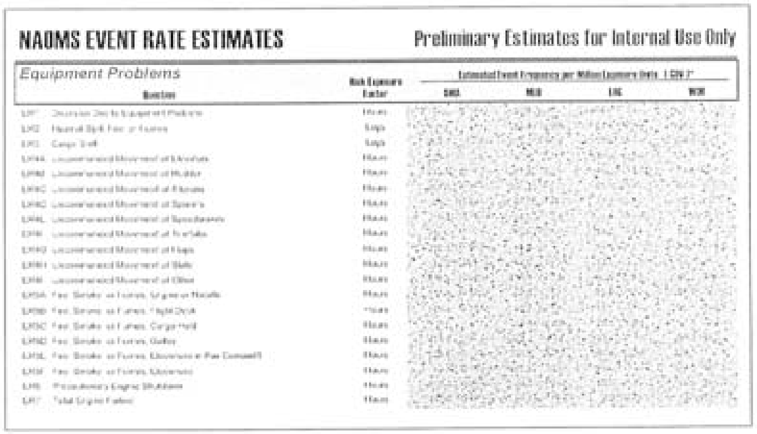
NASA / NAOMS

DEIDENTIFIED SURVEY DATA

RESEARCH PRODUCTS

NAOMS Outputs

- Safety Event Rates and Trends
- Quantitative Analyses of Safety Issues



NAOMS EVENT RATE ESTIMATES

Preliminary Estimates for Internal Use Only

Equipment Problems

Protocol Development and Description

Jon Krosnick

Surveys Can Measure:

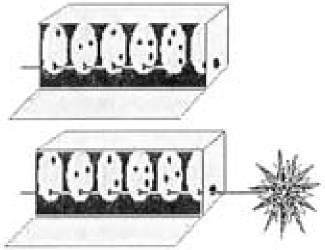
- Attitudes
- Preferences
- Beliefs about the state of the world
- Predictions about the future
- Past behavioral experiences or events

NAOMS will focus on
the measurement of events

NAOMS
Design Decisions

- What events to address?
- What order of questions?
- How long of a recall period?
- What mode?

Types of Events



Accidents	Mid-air collision
↑	
Proximal Causal Events	Incorrect altitude
↑	
Distal Causal Events	Altitude clearance misunderstood by pilot
↑	
Static Contribution Factors	Microphone, earphones, radios, pilot's hearing, noise, etc

Building Lists of Events

- Consultation with Industry/Gov't Safety Group, e.g.
  - CAST
  - FAA
  - ASRS Analysts
  - Workshops
- Review of Aviation Databases, e.g.,
  - ASRS
  - NTSB
  - NAIMS
  - BTS
- Decision: Sample Events at Distal or Proximal Levels of Event Chain
- Focus Groups with Active Professional Participants

Question Ordering

Question Ordering Relates to Memory Organization:

- Records of experiences are organized systematically and thematically in memory
- Asking questions in clusters that match a person's memory organization improves measurement precision
- Various hypotheses about how pilots might organize their memories discussed, but no hard data.

Memory Organizations

- Severity
- Causes
- Phase of Flight

Identifying Memory Organization

- Experiments
- Participants: Air carrier pilots
- Various tasks
  - Order of Recall
  - Labeling of Clusters
  - Sorting of Events into Categories
- Decision: A "hybrid" organization emerged: mostly causes with some phases

Recall Period

Recall Period - The optimal time between event occurrence and survey

- Needs to maximize recall and balance survey logistics
- Memories fade over time
- Participants should not be asked to recall things from too far in the past
- Literature Review: A literature review resulted in data that we felt to be insufficient for our purposes
- Our own study of pilots' recall of mundane flight events: 7 days maximum
- We needed to determine how long more serious events can be remembered

Recall Period: Validity Analysis

- Association of hours flown with number of events witnessed
- Association of days in the recall period with number of events witnessed
- Strongest relationships for one month and two months
- Decision: Keep recall period less than four months (60 days chosen as recall period)

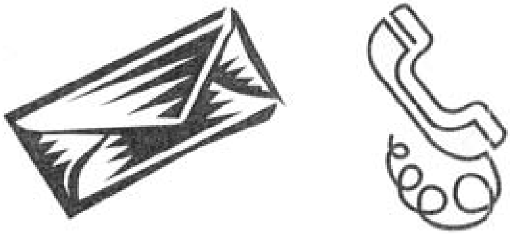
Data Collection Modes

- Mailed, Self-Administered (SAQ)
- Telephone (CATI)
- In-Person

Each mode has positive and negative aspects related to a variety of considerations

Test Findings:

- **Response Rate**
  - Mail 73%
  - Telephone 81%
- **Completion Rate**
  (% missing responses)
  - Mail 4.8%
  - Telephone 0.0%
- **Confidence Rating**
  - Mail 80%
  - Telephone 91%



In-Person Interviewing
Terminated Early d/t Time
and Cost Investment

Mode: Selection and Validation

- **Validation results:**
  - More hours flown should be associated with more events witnessed
  - More days in the recall period should be associated with more events witnessed
  - Stronger relationships indicate more accurate reporting
- **Mode selection:**
  - 30% stronger relationships for telephone than mail
- **Decision: Perform telephone interviewing (Computer Assisted Telephone Interview - CATI)**

Summary of Design Conclusions

- Address as many safety events identified during preliminary investigations as practical
- Order questions to match hybrid clustering
- Use 60-day recall period to maximize documentation of rare events
- Use telephone interviewing to maximize measurement accuracy

Data Collection

Joan Cwi

Sample Design

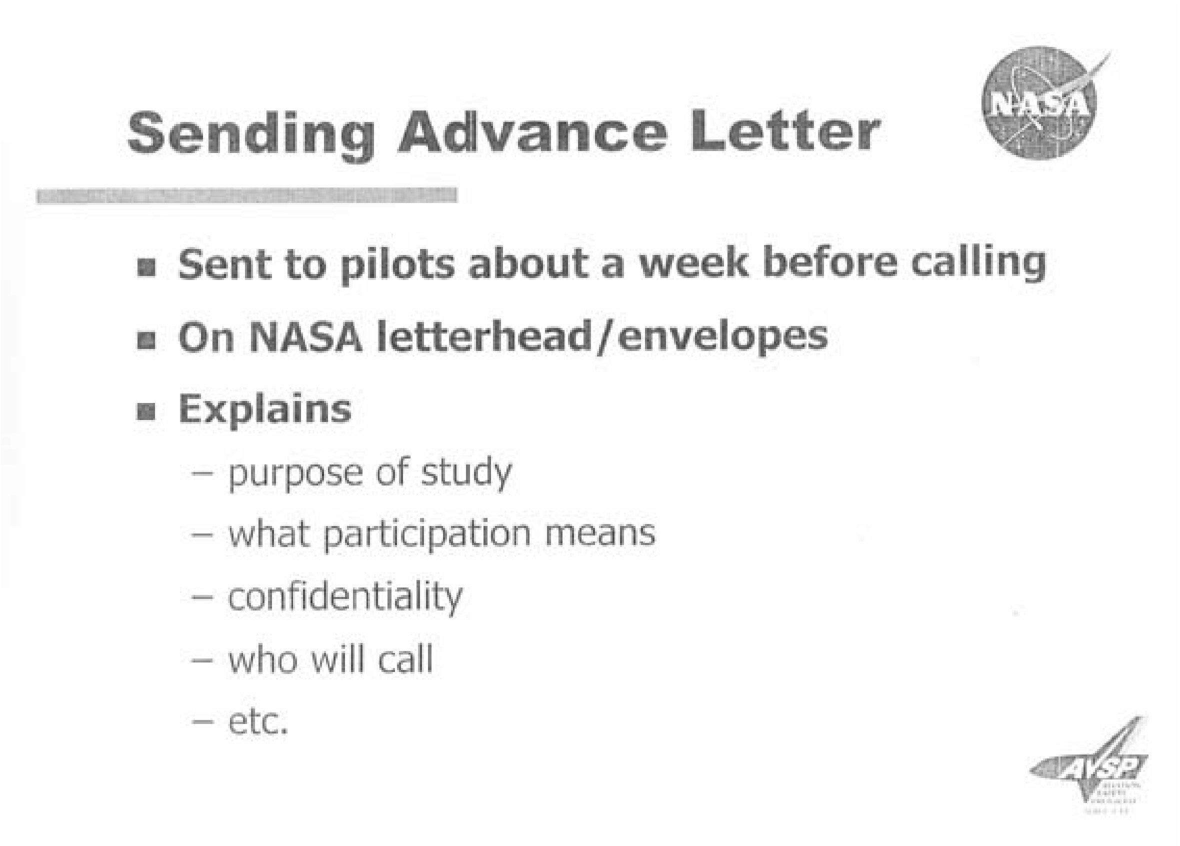
- **Sample source**
  - Airmen Certification Directory (N = 670,000)
  - Available online at FAA Oklahoma City
- **Samples are drawn among U.S.-based pilots**
  - Air Carrier (N = 55,000) currently available
- **Sample drawn on quarterly basis**
  - Sampling without replacement for 12 rolling months

Locating Pilots

- **Addresses updated, telephone numbers obtained**
  - National Change of Address
  - Telematch
  - Other sources, such as Directory Assistance, Web sites
- **Location results**
  - 80% of AC pilots

Interviewing Process

- Sending Advance Letter
- Screening for Eligibility
- Conducting the Interview

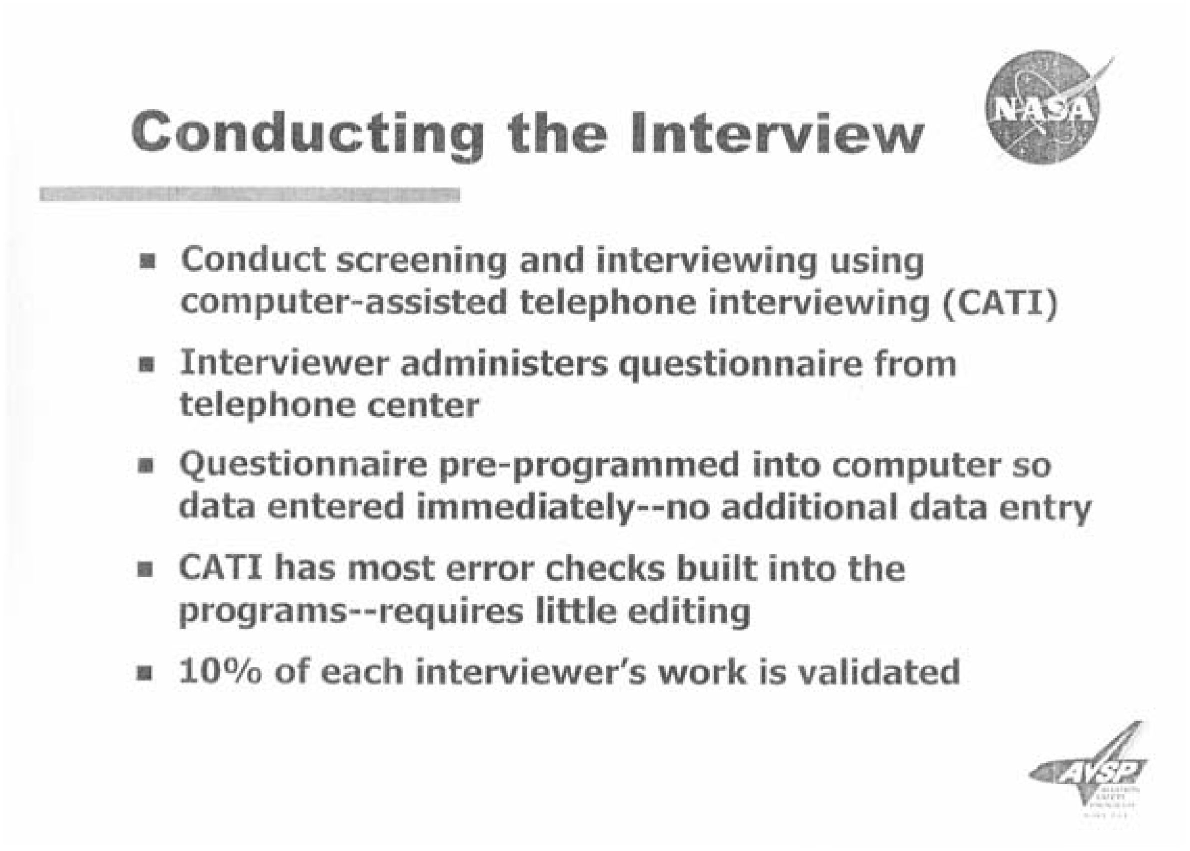


Sending Advance Letter

- Sent to pilots about a week before calling
- On NASA letterhead/envelopes
- Explains
  - purpose of study
  - what participation means
  - confidentiality
  - who will call
  - etc.

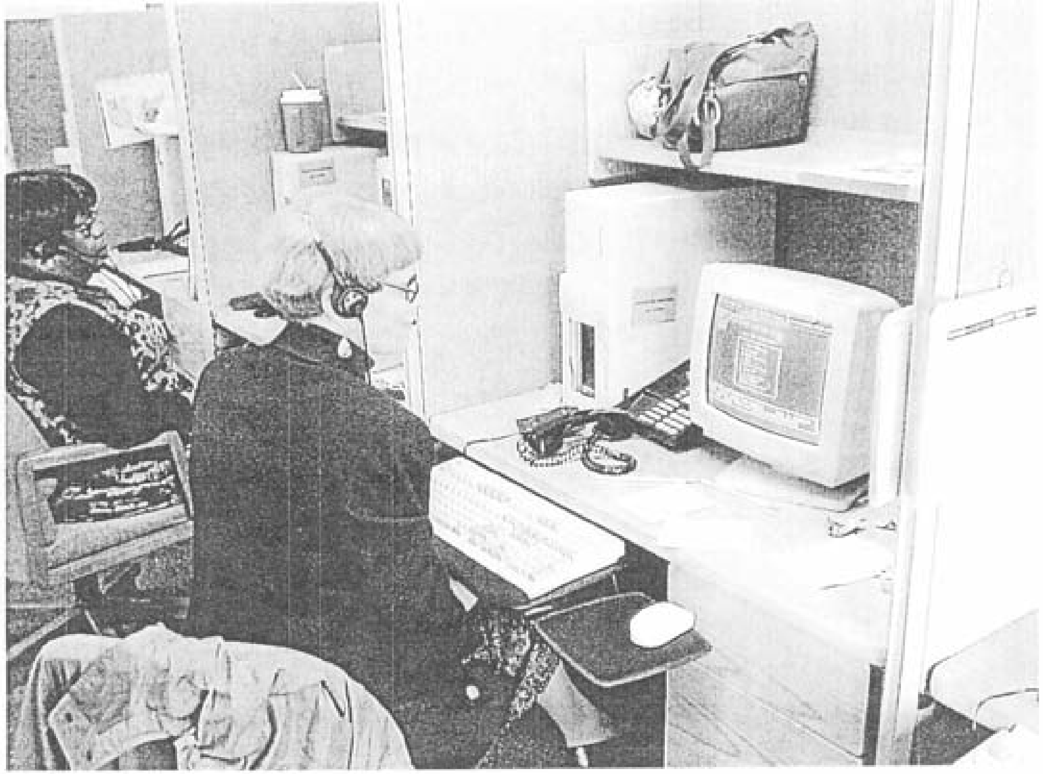
Screening for Eligibility

- Attempt to screen all pilots by telephone
- AC screener
  - Determines pilot has flow in last 60 days as air carrier pilot



Conducting the Interview

- Conduct screening and interviewing using computer-assisted telephone interviewing (CATI)
- Interviewer administers questionnaire from telephone center
- Questionnaire pre-programmed into computer so data entered immediately--no additional data entry
- CATI has most error checks built into the programs--requires little editing
- 10% of each interviewer's work is validated



Air Carrier Interviewing Effort

- **Yearly interviewing effort**
  - Sample size (N = 14,300)
  - Screening (N = 10,700)
  - Interview (N = 8,000)
  - Interview length averages 18 minutes
- **Non- completes**
  - No locates (N = 18%)
  - Not eligible (N = 19%)
- **Progress to date (1.5 years)**
  - 11,800 completed interviews

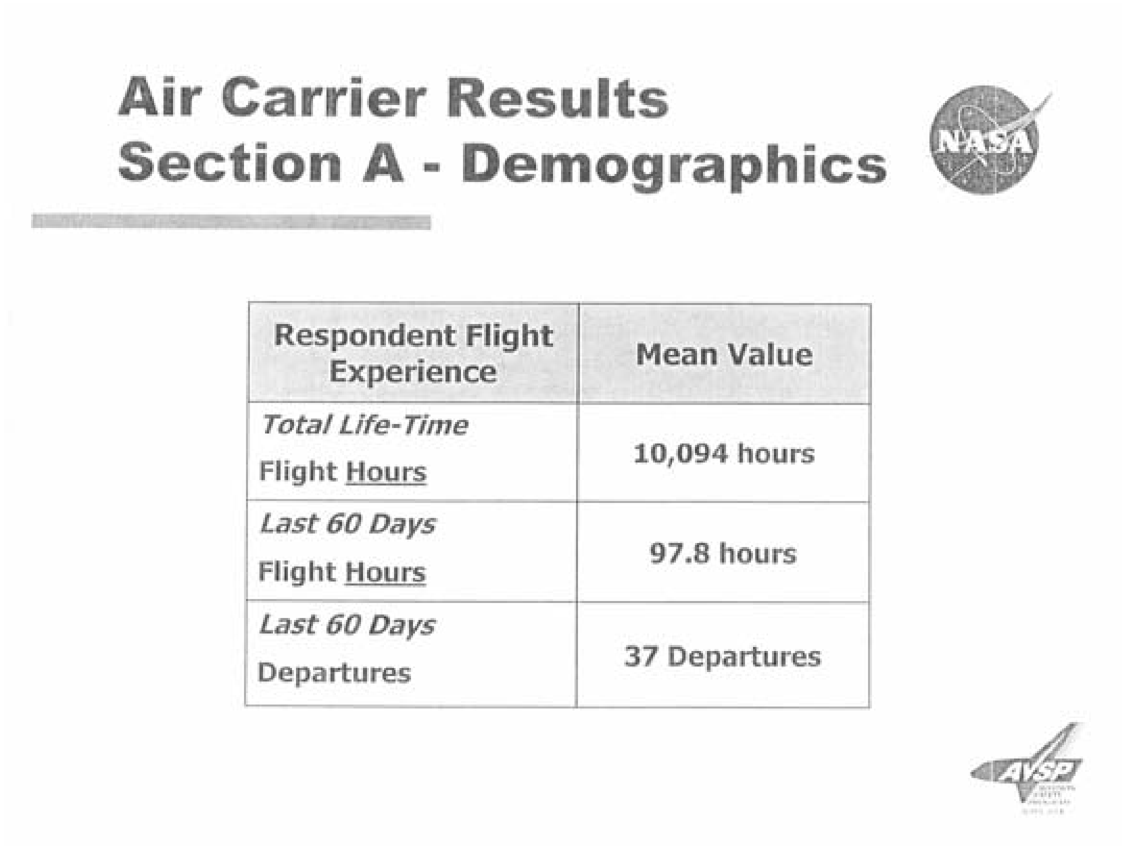
Air Carrier Survey Overview

Linda Connell

Air Carrier Questionnaire Structure*

- **Section A: Descriptive Demographic Information**
  - Information suitable for exposure determination: Lifetime hours flown, hours and legs flown last 60 days, aircraft make/model, type flights, crew position and more
- **Section B: Safety Related Events**
  - Consistent data set over time
- **Section C: Focus Questions**
  - Specific topics driven by government/industry high-priority needs
- **Section D: Questionnaire Feedback**

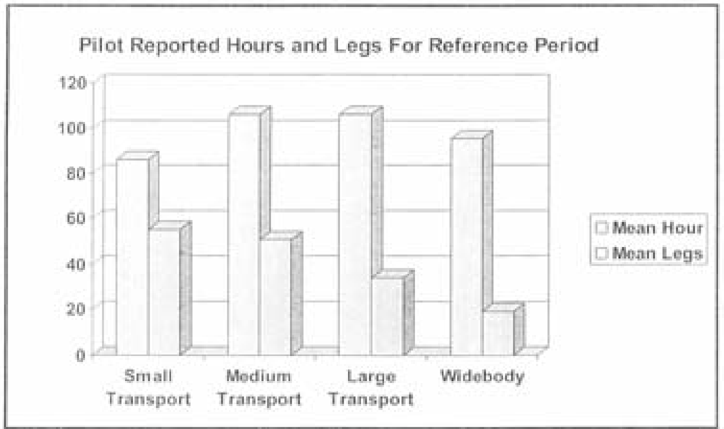
*** Data collection started April, 2001; over 11,800 completed interviews to date**



Air Carrier Results
Section A - Demographics

Respondent Flight Experience	Mean Value
Total Life-Time Flight Hours	10,094 hours
Last 60 Days Flight Hours	97.8 hours
Last 60 Days Departures	37 Departures

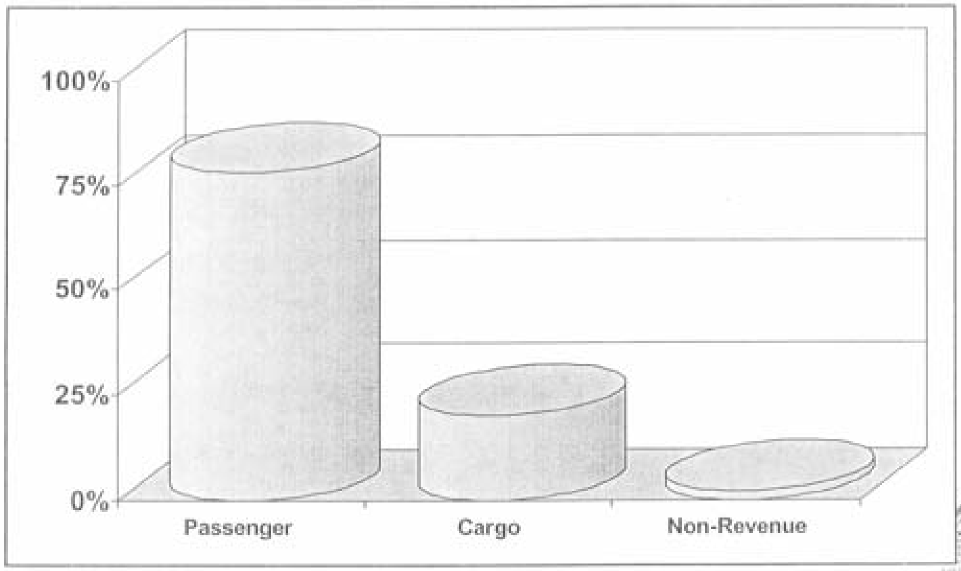
Hours and Legs by Aircraft Size

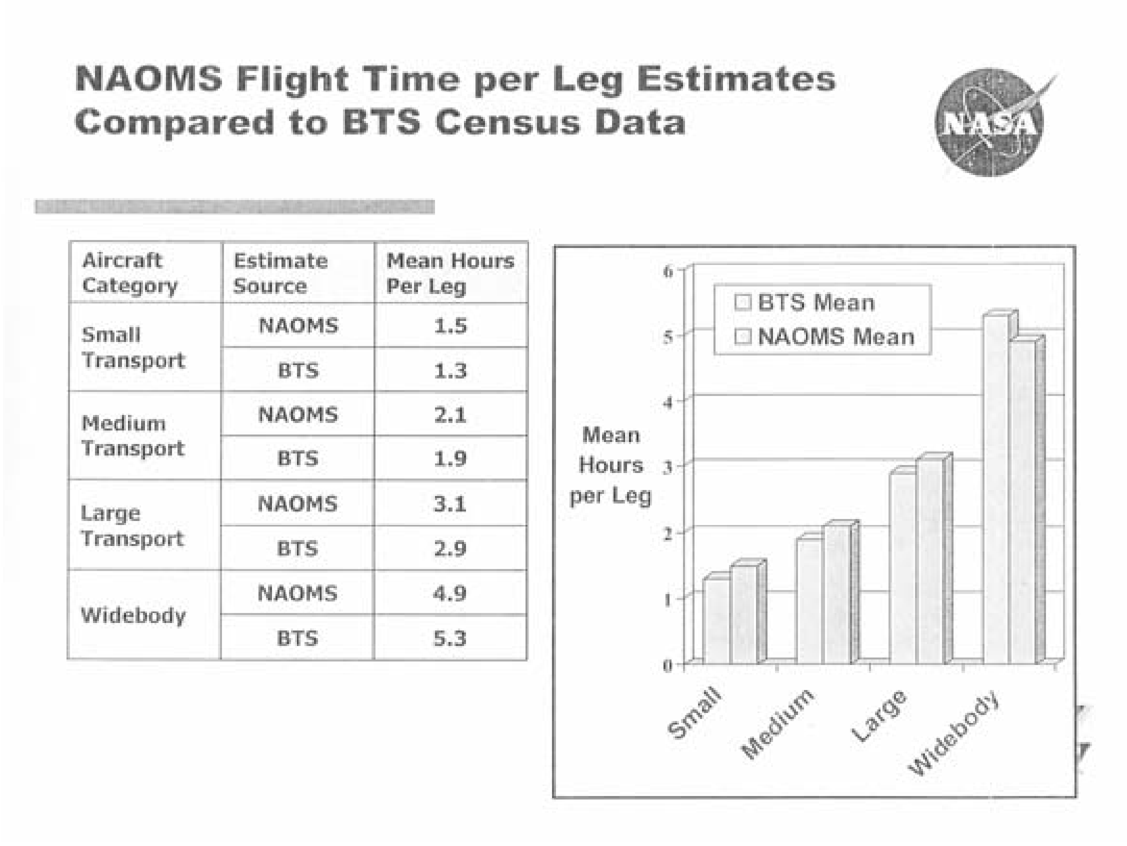

Pilot Reported Hours and Legs For Reference Period

Aircraft Size	Mean Hours Per Leg
Small Transport	1.5
Medium Transport	2.1
Large Transport	3.1
Widebody	4.9

- Small Transport < 100 k lbs GTOW
- Medium Transport ≥ 100 k lbs and < 200 k lbs GTOW
- Large Transport > 200 k lbs GTOW with single aisle
- Widebody > 300k lbs GTOW with two aisles

Type of Flight

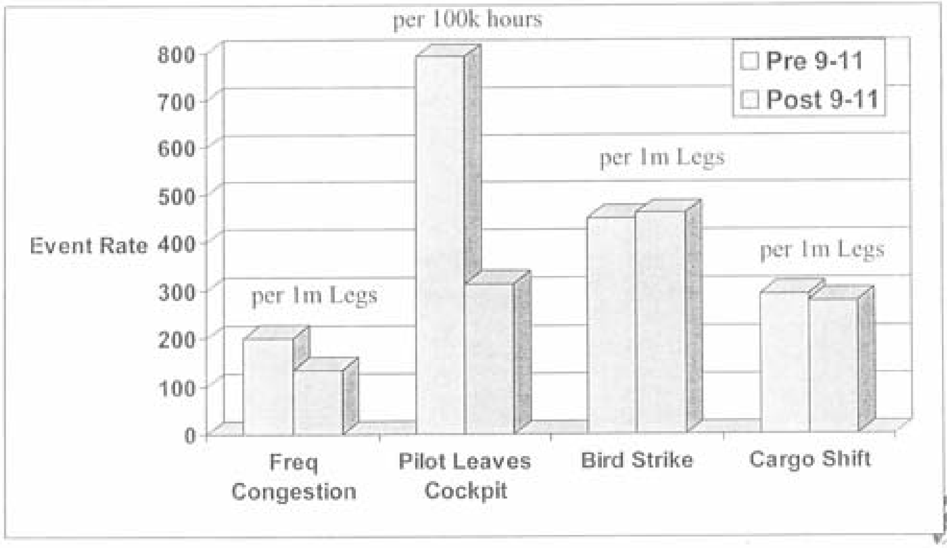


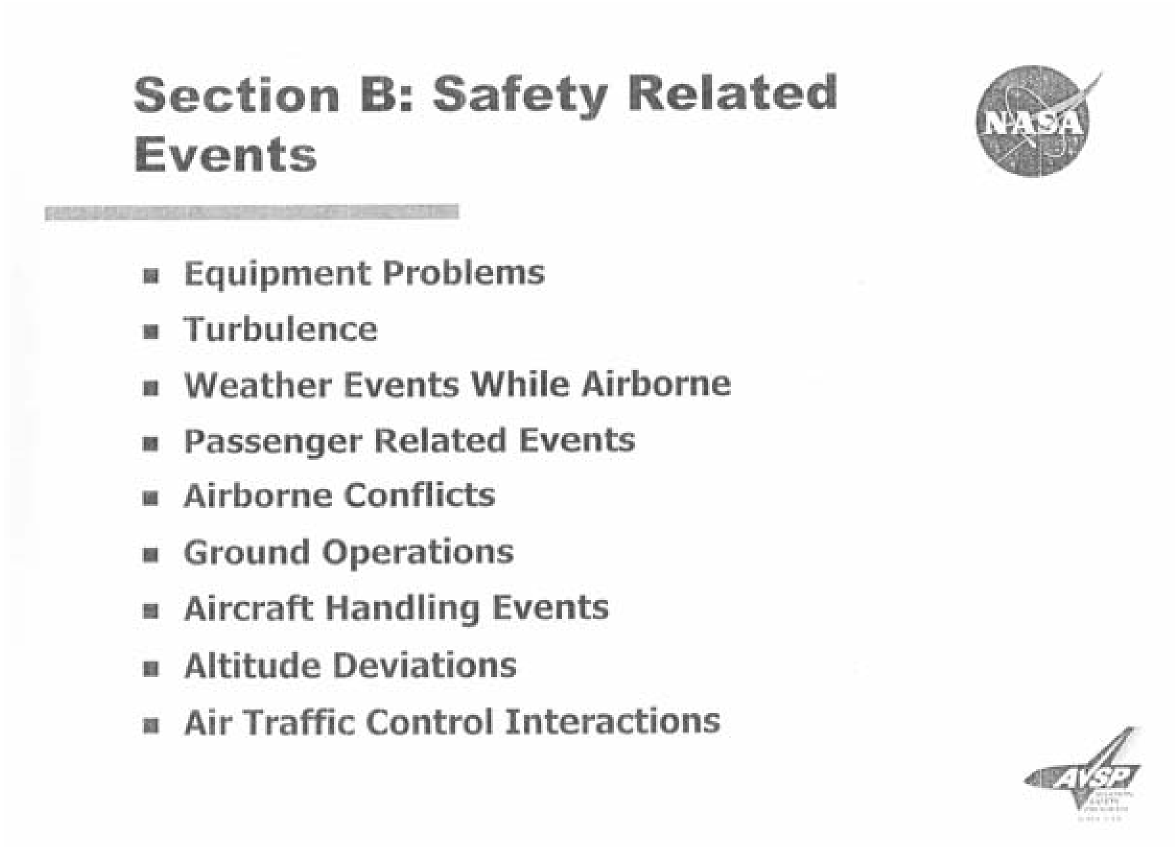


NAOMS Flight Time per Leg Estimates Compared to BTS Census Data

Aircraft Category	Estimate Source	Mean Hours Per Leg
Small Transport	NAOMS	1.5
	BTS	1.3
Medium Transport	NAOMS	2.1
	BTS	1.9
Large Transport	NAOMS	3.1
	BTS	2.9
Widebody	NAOMS	4.9
	BTS	5.3

Pre and Post 9-11 Evaluation of Sample Events





Section B: Safety Related Events

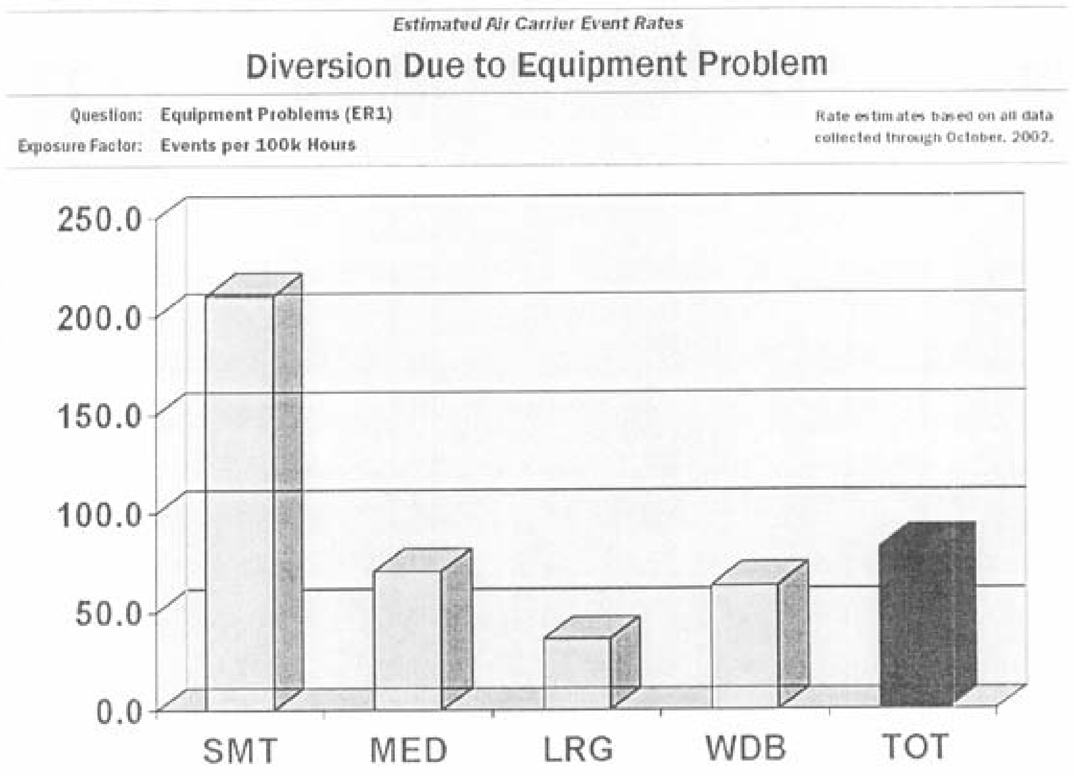
- Equipment Problems
- Turbulence
- Weather Events While Airborne
- Passenger Related Events
- Airborne Conflicts
- Ground Operations
- Aircraft Handling Events
- Altitude Deviations
- Air Traffic Control Interactions

Example
Air Carrier Results

Robert Dodd

Equipment-Related Events

This section addresses aircraft related equipment failures such as equipment-related diversions, engine problems, uncommanded movements etc.


Estimated Air Carrier Event Rates
Diversion Due to Equipment Problem
Question: Equipment Problems (ER1)
Exposure Factor: Events per 100k Hours
Rate estimates based on all data collected through October, 2002.
250.0
200.0
150.0
100.0
50.0
0.0
SMT
MED
LRG
WDB
TOT

Turbulence Events

Questions address weather-related, clear-air, and wake turbulence.

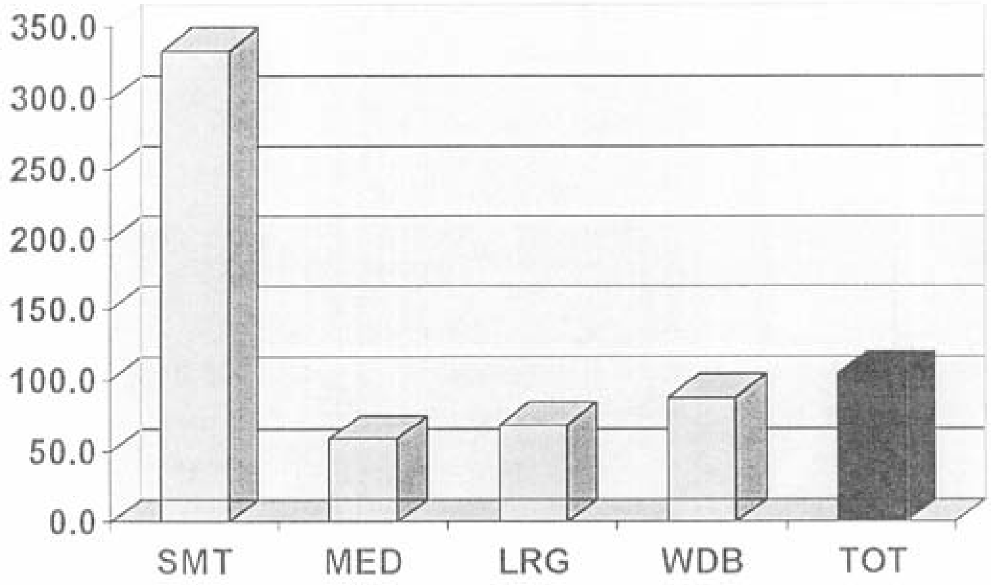
Estimated Air Carrier Event Rates

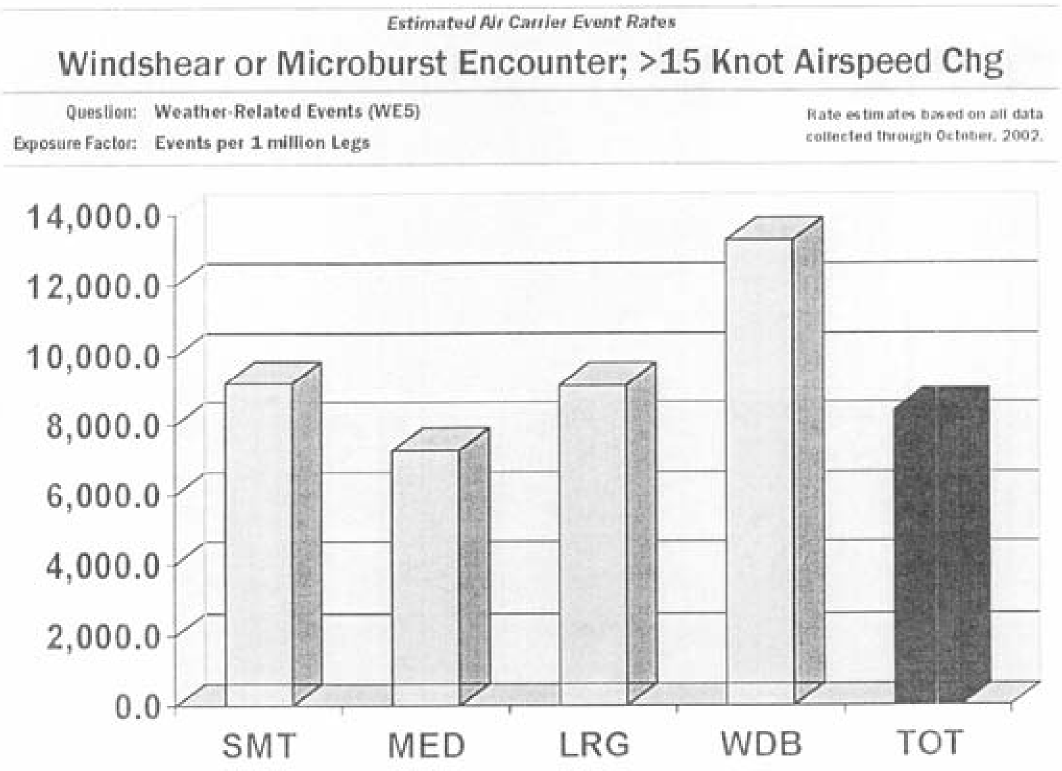
Severe Turbulence Encounter

Question: **Turbulence Encounters (TU1)**

Exposure Factor: **Events per 100k Hours**

Rate estimates based on all data collected through October, 2002.



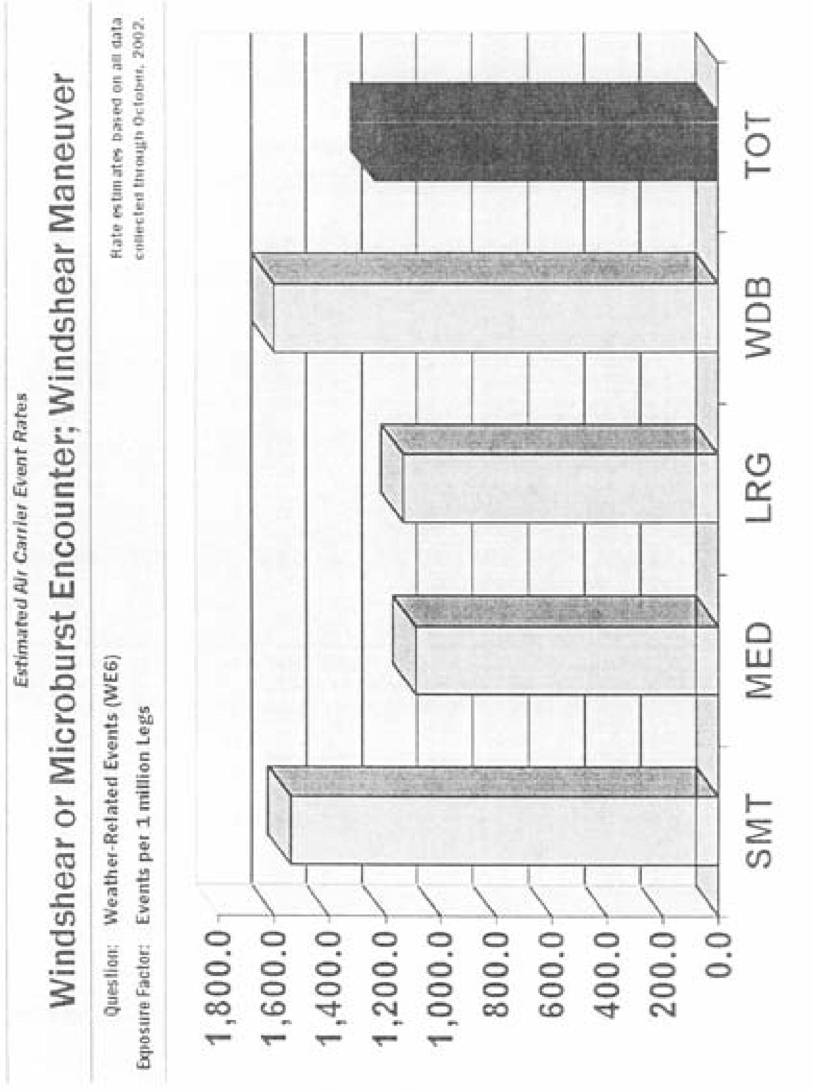


Estimated Air Carrier Event Rates

Windshear or Microburst Encounter; >15 Knot Airspeed Chg

Question: Weather-Related Events (WE5)
Exposure Factor: Events per 1 million Legs

Rate estimates based on all data collected through October, 2002.



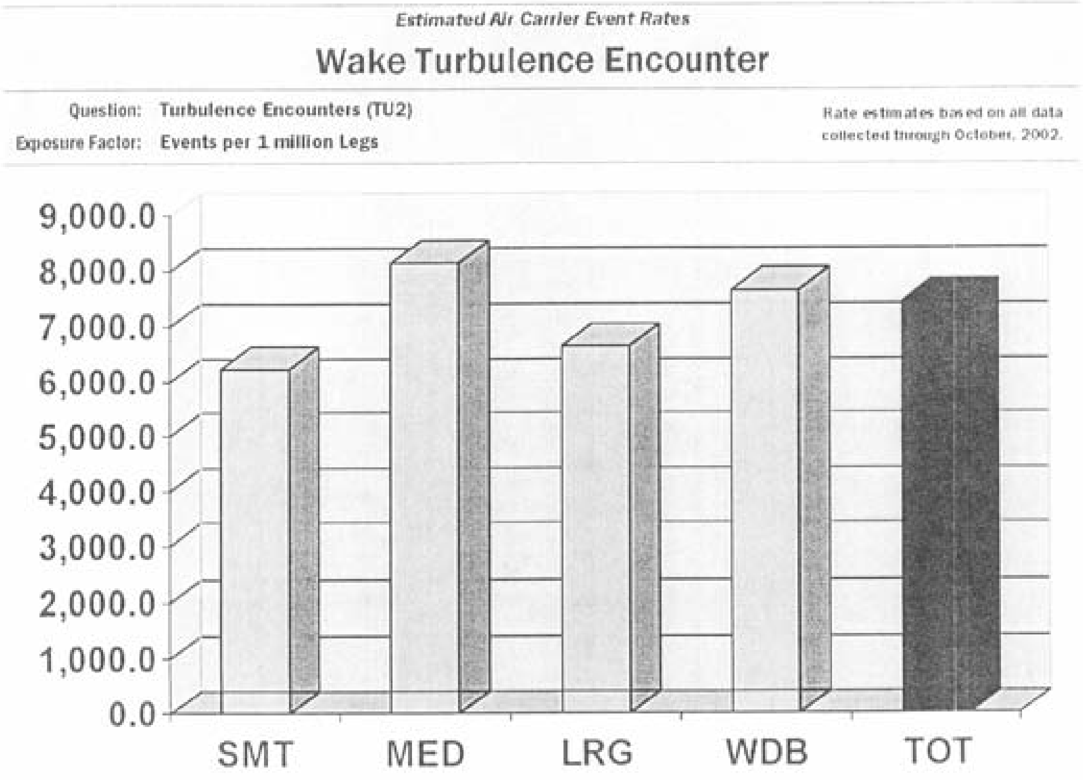
Estimated Air Carrier Event Rates

Windshear or Microburst Encounter; Windshear Maneuver

Question: Weather-Related Events (WE6)

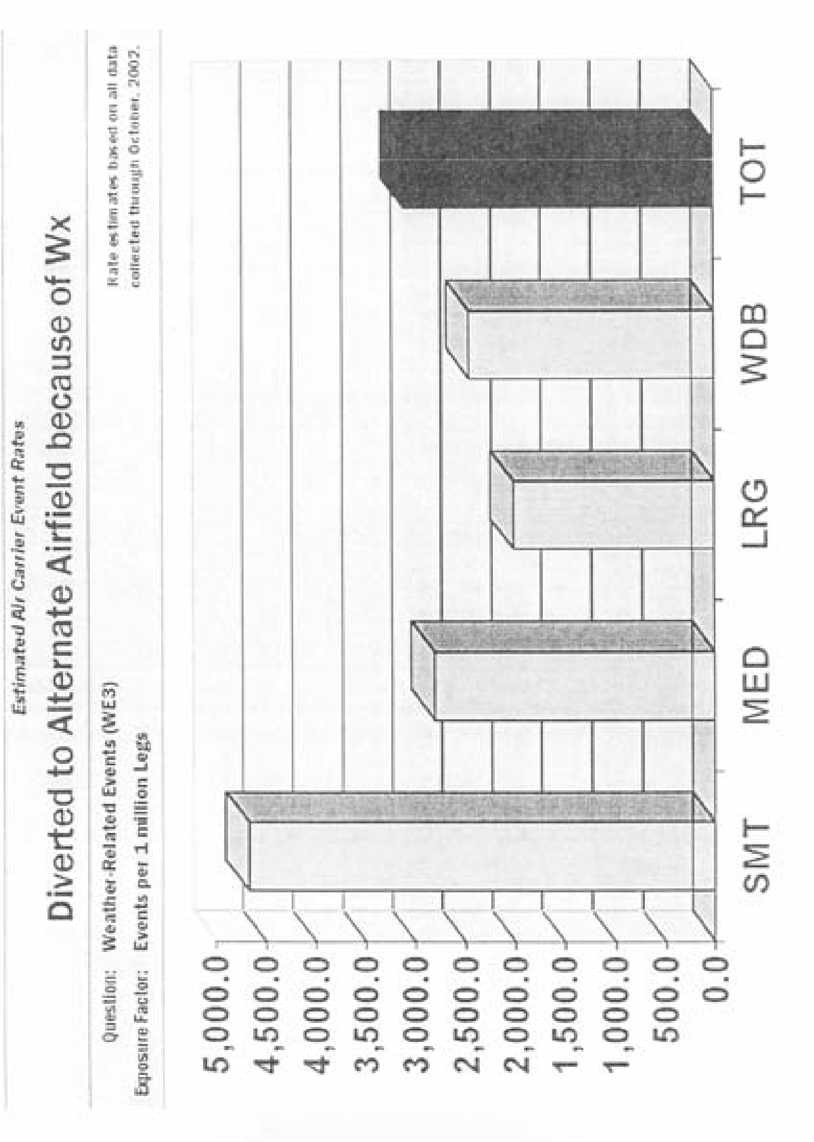
Exposure Factor: Events per 1 million Legs

Rate estimates based on all data collected through October, 2002.


Estimated Air Carrier Event Rates
Wake Turbulence Encounter
Question: Turbulence Encounters (TU2)
Exposure Factor: Events per 1 million Legs
Rate estimates based on all data collected through October, 2002.
9,000.0
8,000.0
7,000.0
6,000.0
5,000.0
4,000.0
3,000.0
2,000.0
1,000.0
0.0
SMT
MED
LRG
WDB
TOT

Weather-Related Events

Questions focus on weather related events and issues. Topics include, but are not limited to, airframe icing, wind shear, weather diversions and other factors.



Estimated Air Carrier Event Rates

Diverted to Alternate Airfield because of Wx

Question: Weather-Related Events (WE3)

Exposure Factor: Events per 1 million Legs

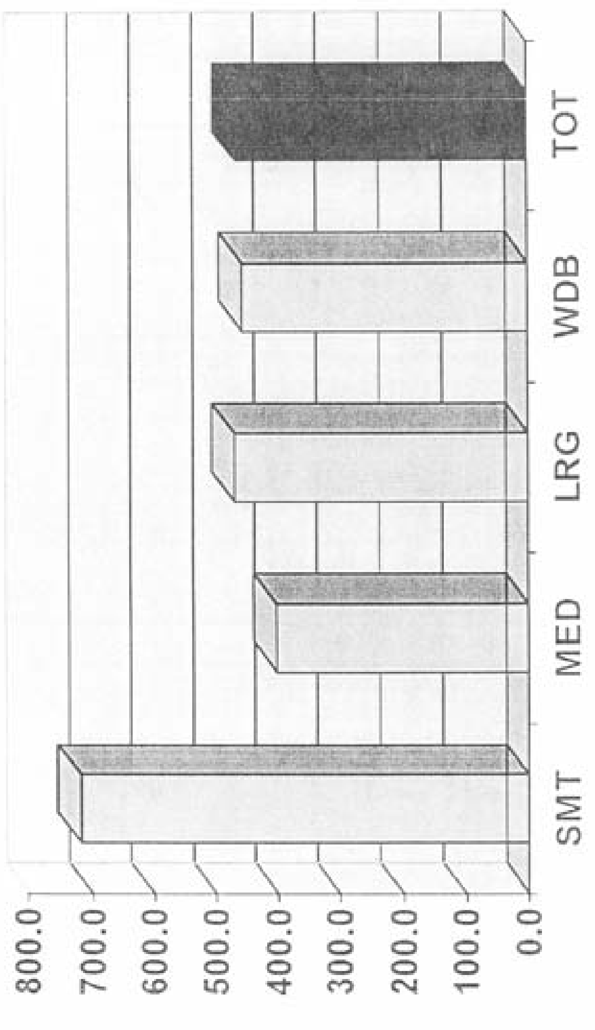
Rate estimates based on all data collected through October, 2002.

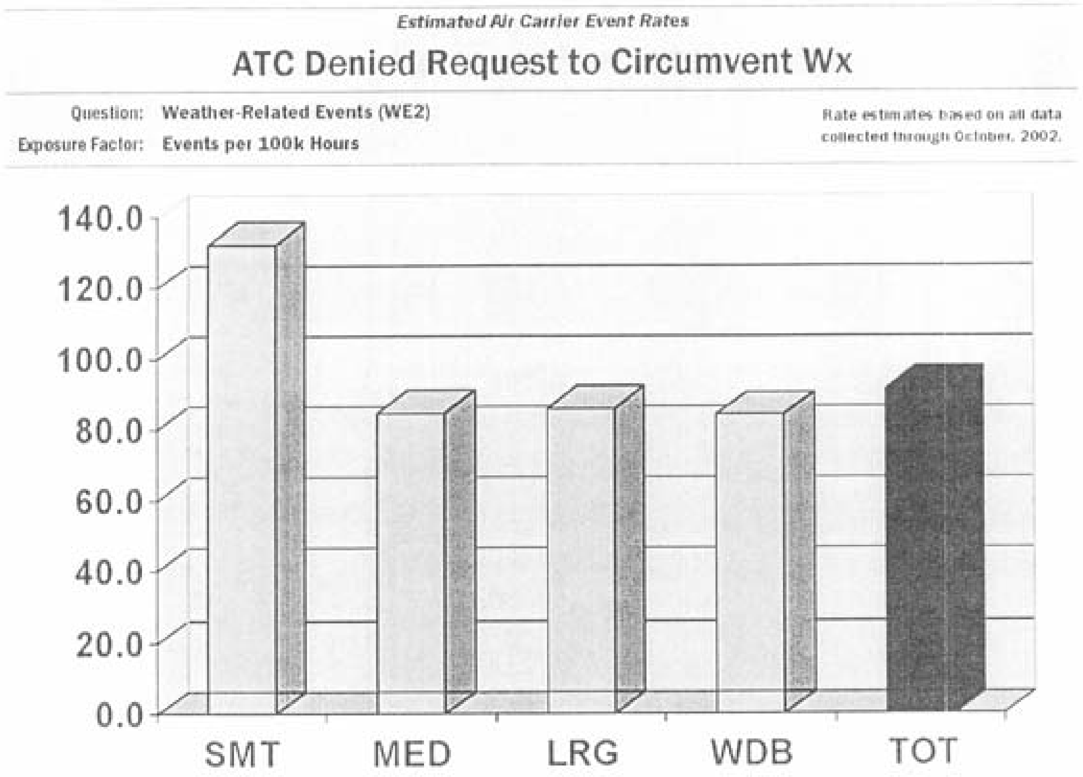
Estimated Air Carrier Event Rates

Lacked Good Wx Info while Airborne

Question: Weather-Related Events (WE1)
Exposure Factor: Events per 100k Hours

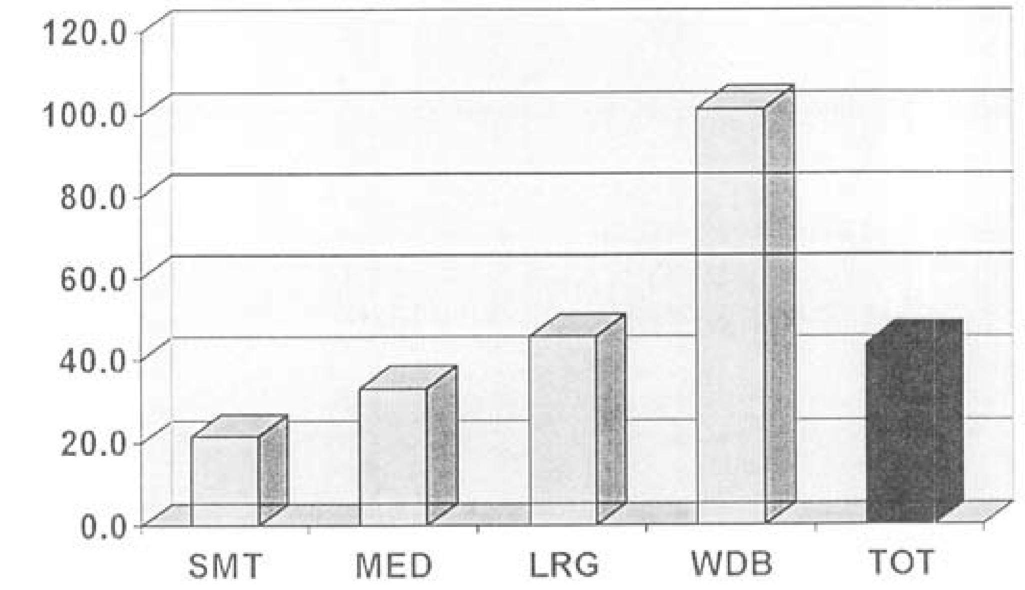
Rate estimates based on all data collected through October, 2002.




Estimated Air Carrier Event Rates
ATC Denied Request to Circumvent Wx
Question: Weather-Related Events (WE2)
Exposure Factor: Events per 100k Hours
Rate estimates based on all data collected through October, 2002.
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
SMT
MED
LRG
WDB
TOT

Passenger-Related Events

These questions focus on
passenger emergencies
and disruptions.



Estimated Air Carrier Event Rates

Pilot Left Cockpit to Deal with Pax Disturbance

Question: **Passenger-Related Events (CP3)**
Exposure Factor: **Events per 100k Hours**

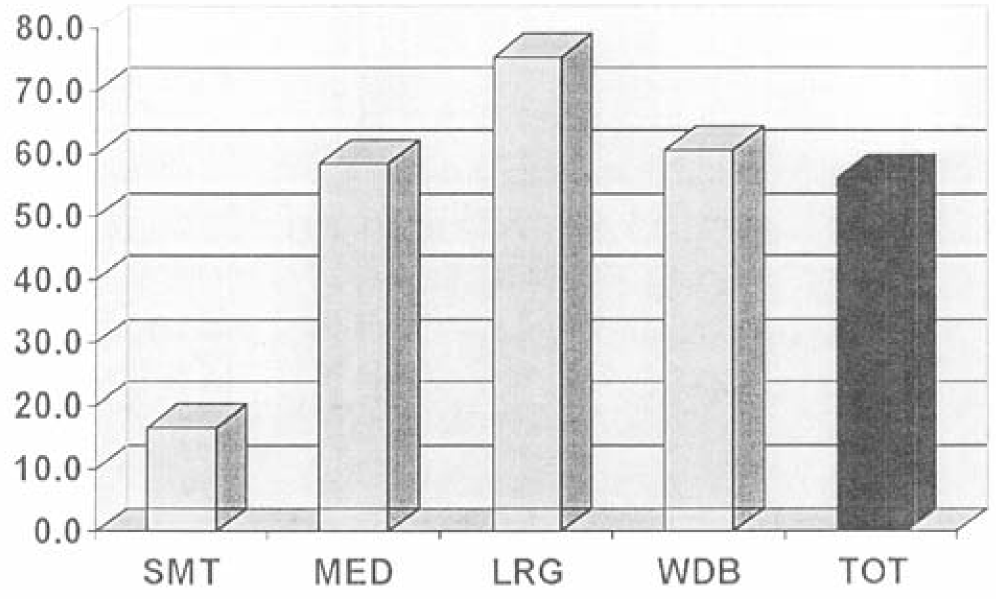
Rate estimates based on all data collected through October, 2002.

Estimated Air Carrier Event Rates

Expedited Lndg or Diversion due to Pax Medical Emergency

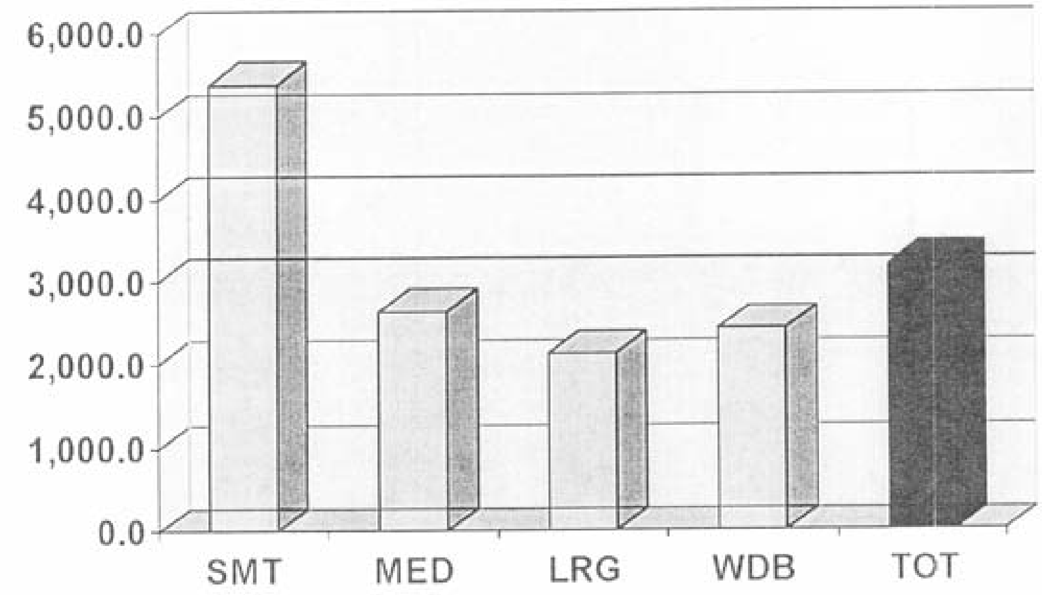
Question: Passenger-Related Events (CP1)
Exposure Factor: Events per 100k Hours

Rate estimates based on all data collected through October, 2002.



Airborne Conflicts

Airborne conflicts involve issues such as near mid-air collisions, evasive actions to avoid collisions and bird strikes.



Estimated Air Carrier Event Rates

Evasive Action; >500 ft Separation

Question: Airborne Conflicts (AC2)
Exposure Factor: Events per 1 million Legs

Rate estimates based on all data collected through October, 2002.

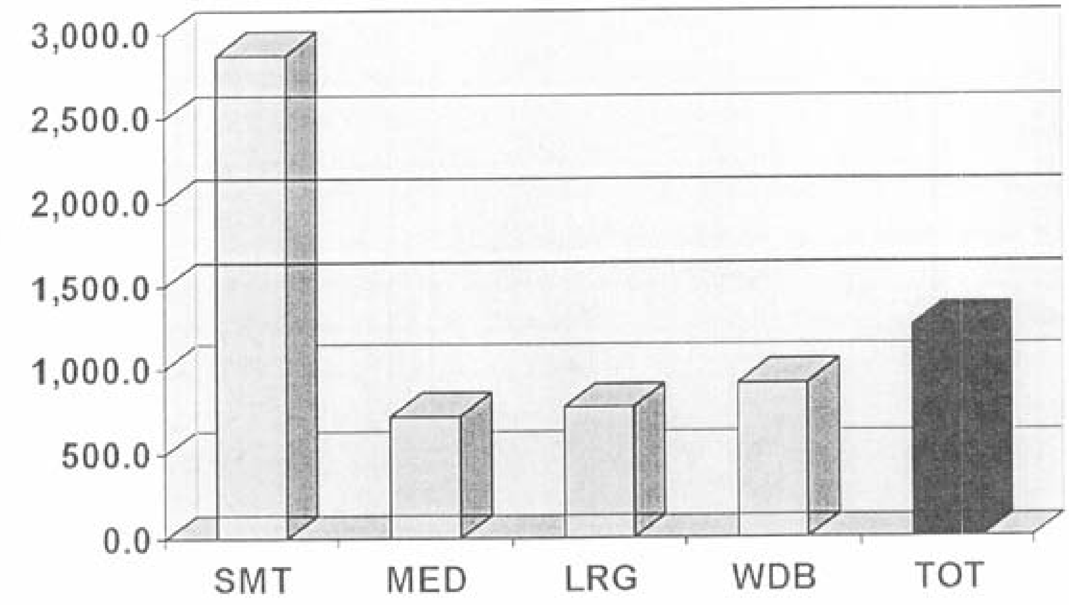
Estimated Air Carrier Event Rates

<500 ft Separation

Question: **Airborne Conflicts (AC3)**

Exposure Factor: **Events per 1 million Legs**

Rate estimates based on all data collected through October, 2002.

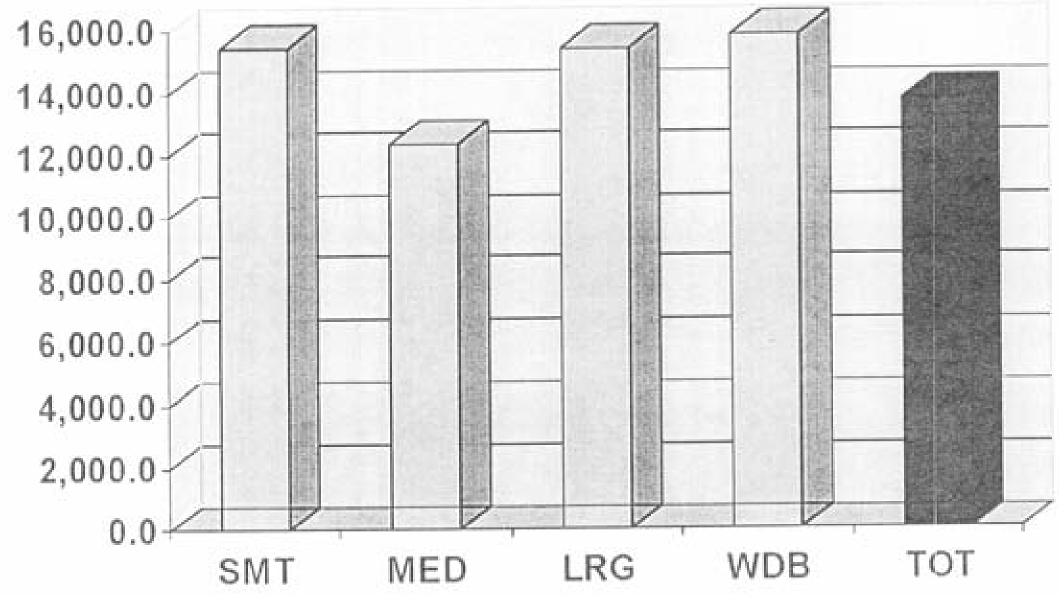


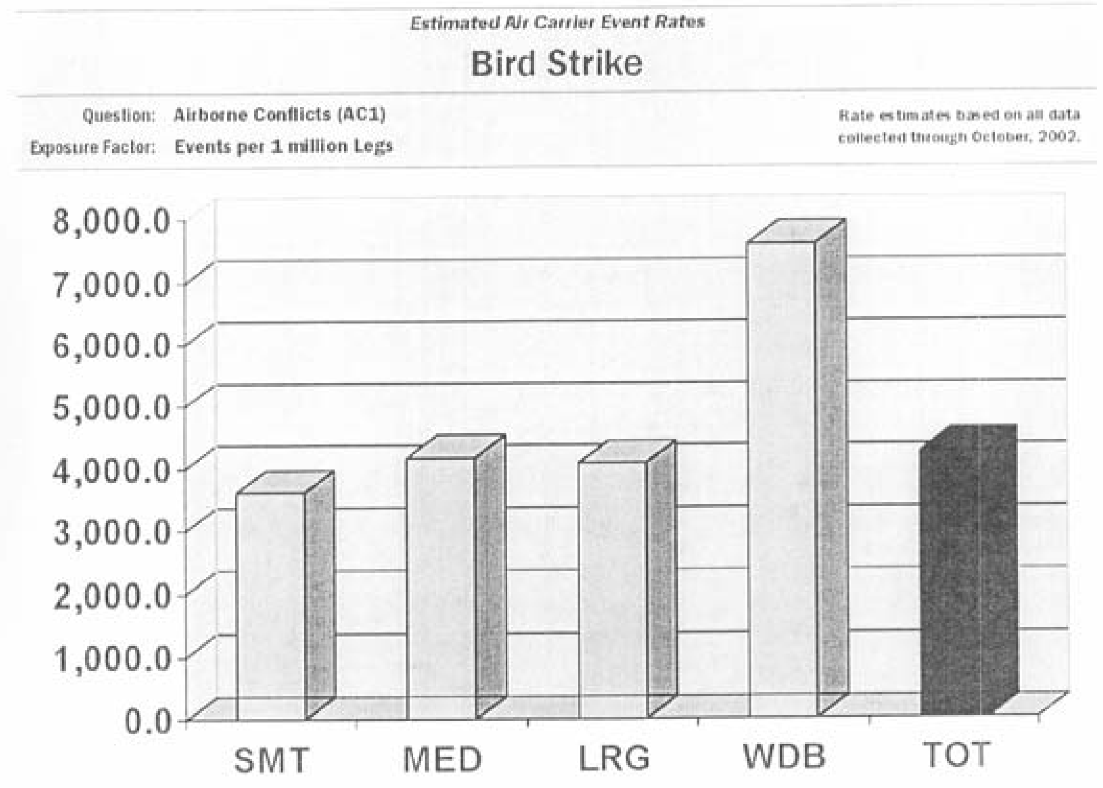
Estimated Air Carrier Event Rates

Lost Sight of Visually Separated Acft

Question: Aircraft Handling Events (AH3)
Exposure Factor: Events per 1 million Legs

Rate estimates based on all data collected through October, 2002.





Estimated Air Carrier Event Rates

Bird Strike

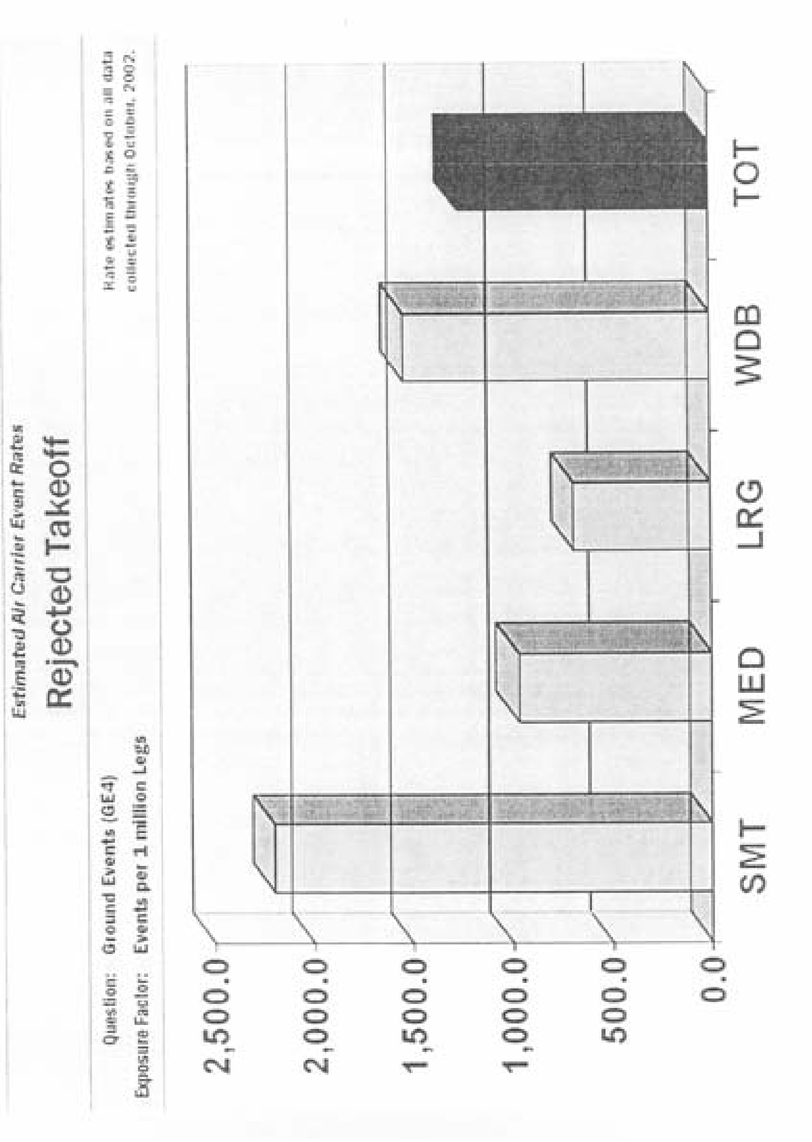
Question: **Airborne Conflicts (AC1)**

Exposure Factor: **Events per 1 million Legs**

Rate estimates based on all data collected through October, 2002.

Ground Operations

This section asks questions relating to aircraft departures from paved surfaces, near collisions with other vehicles on the ground, intrusion into occupied runways, rejected takeoffs, and more.



Estimated Air Carrier Event Rates

Rejected Takeoff

Question: Ground Events (GE4)

Exposure Factor: **Events per 1 million Legs**

Rate estimates based on all data collected through October, 2002.

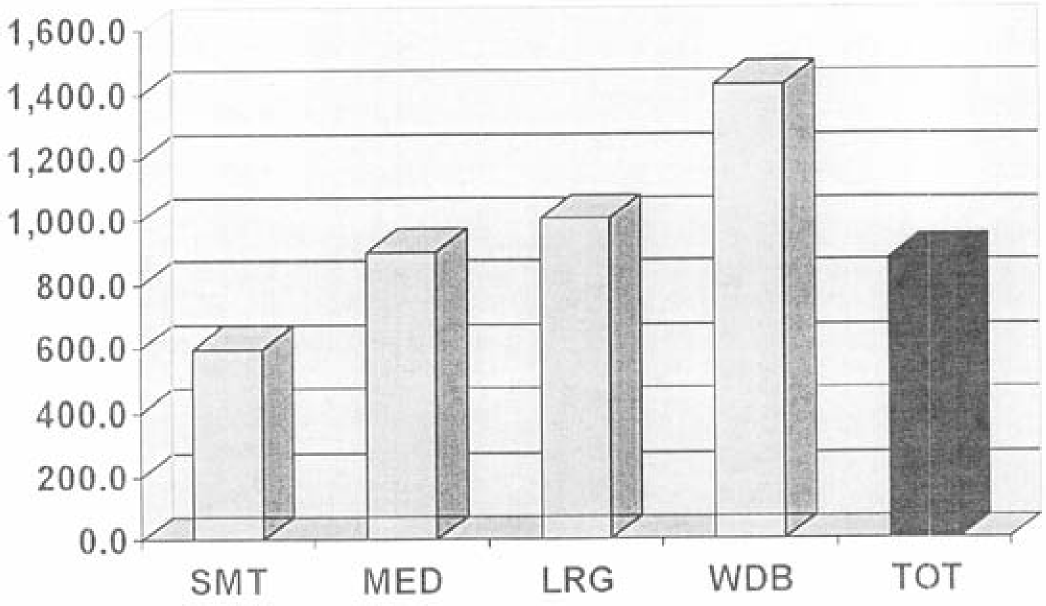
Estimated Air Carrier Event Rates

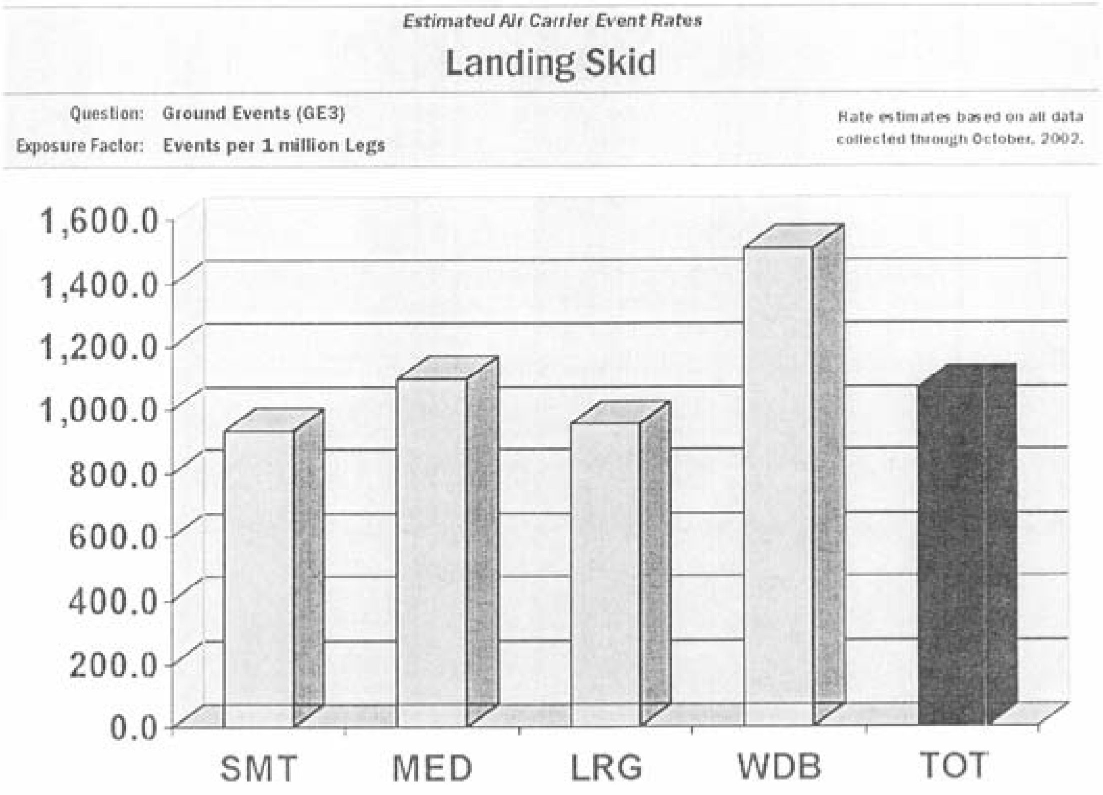
Ground Conflict with Vehicle

Question: Ground Events (GE2)

Exposure Factor: Events per 1 million Legs

Rate estimates based on all data collected through October, 2002.





Estimated Air Carrier Event Rates

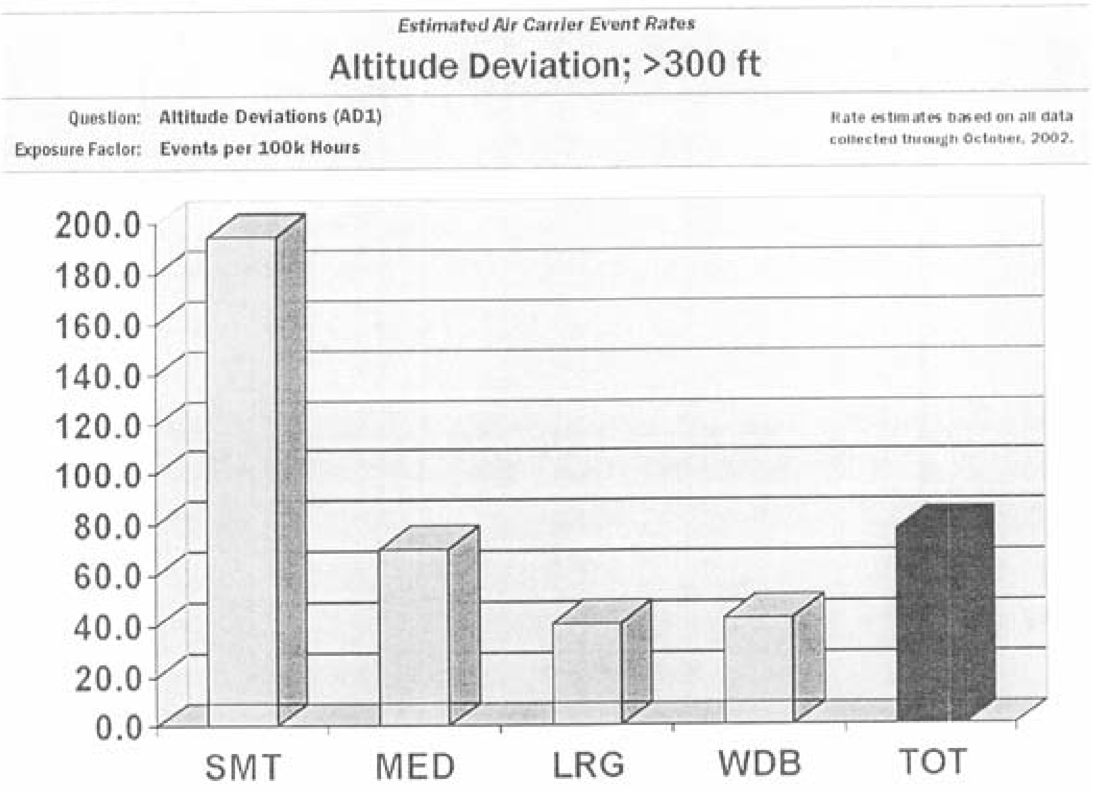
Landing Skid

Question: Ground Events (GE3)
Exposure Factor: Events per 1 million Legs

Rate estimates based on all data collected through October, 2002.

Spatial Deviations

Questions relate to altitude overshoots, inadvertent altitude deviations, and descents below minimum safe altitude (MSA), track deviations, and airspace incursions/excursions.

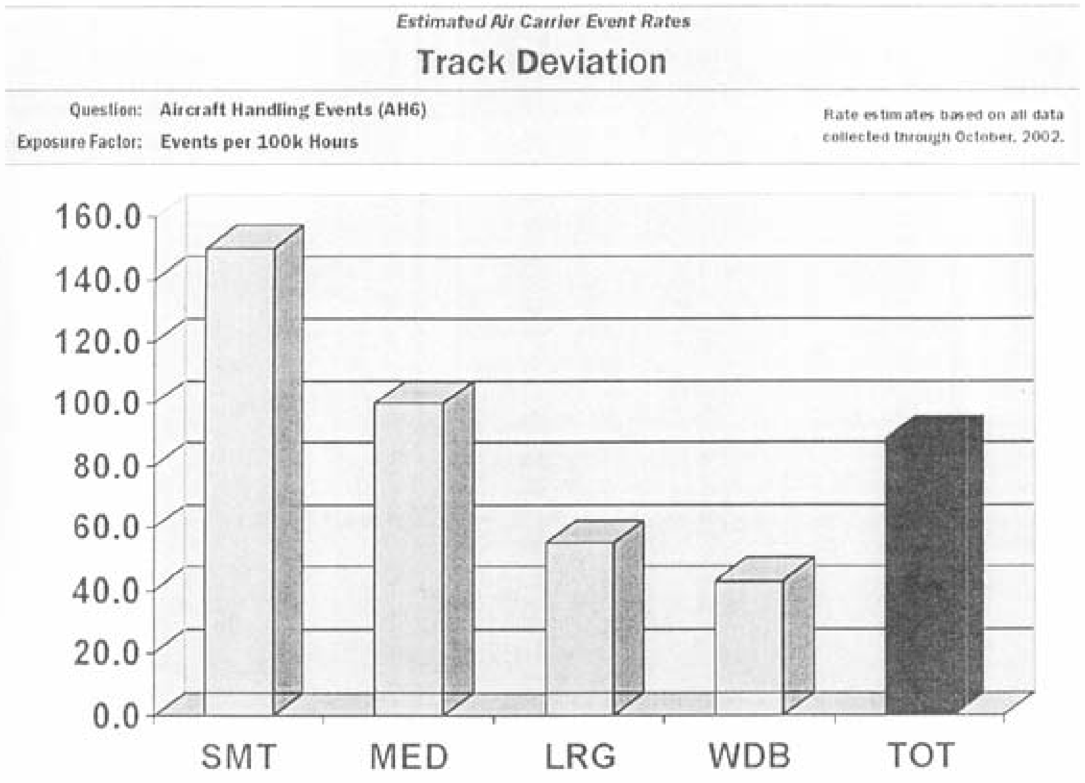


Estimated Air Carrier Event Rates

Altitude Deviation; >300 ft

Question: **Altitude Deviations (AD1)**
Exposure Factor: **Events per 100k Hours**

Rate estimates based on all data collected through October, 2002.



Estimated Air Carrier Event Rates

Track Deviation

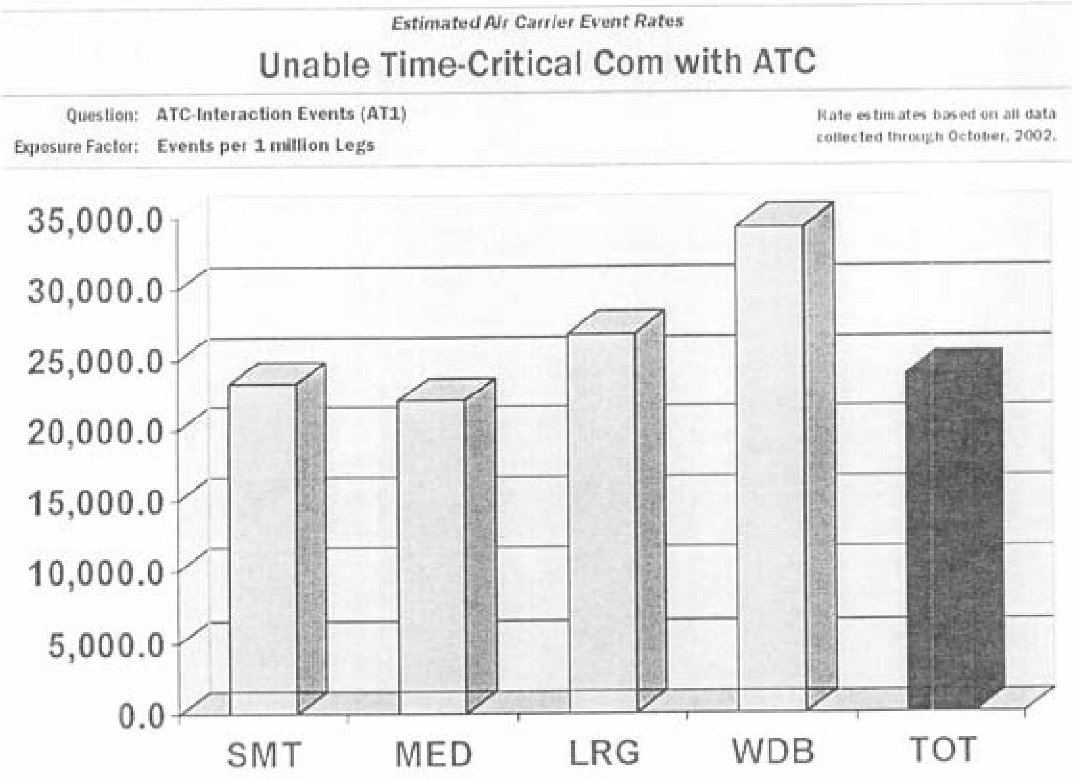
Question: **Aircraft Handling Events (AH6)**

Exposure Factor: **Events per 100k Hours**

Rate estimates based on all data collected through October, 2002.

Pilot Interactions with ATC

These questions are related to frequency congestion, rushed (high or fast) approaches and other ATC related issues.



Estimated Air Carrier Event Rates

Unable Time-Critical Com with ATC

Question: **ATC-Interaction Events (AT1)**
Exposure Factor: **Events per 1 million Legs**

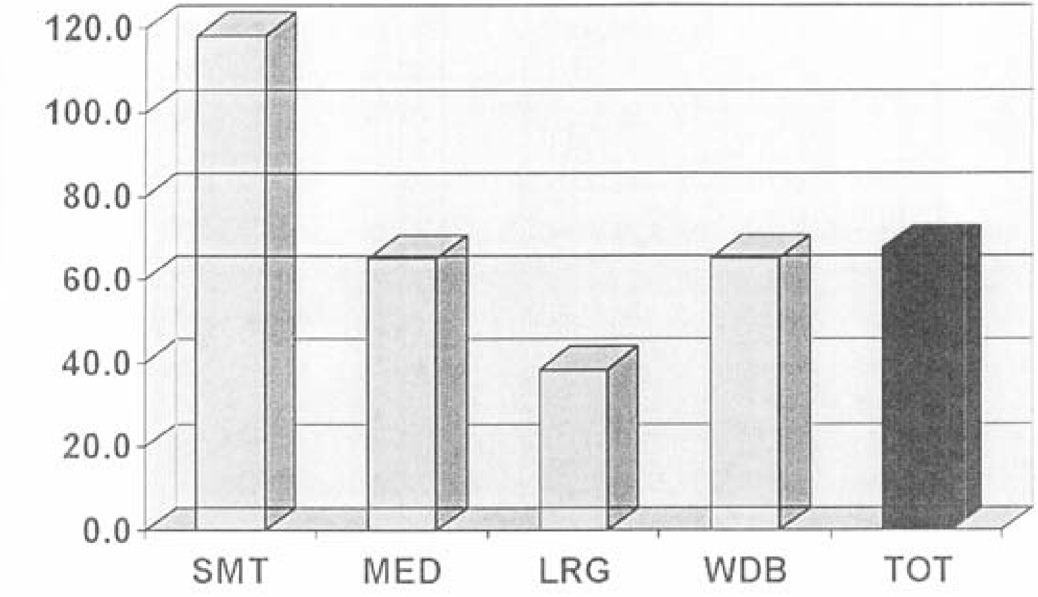
Rate estimates based on all data collected through October, 2002.

Estimated Air Carrier Event Rates

Accepted Clearance; Could Not Comply

Question: Aircraft Handling Events (AH2)
Exposure Factor: Events per 100k Hours

Rate estimates based on all data collected through October, 2002.

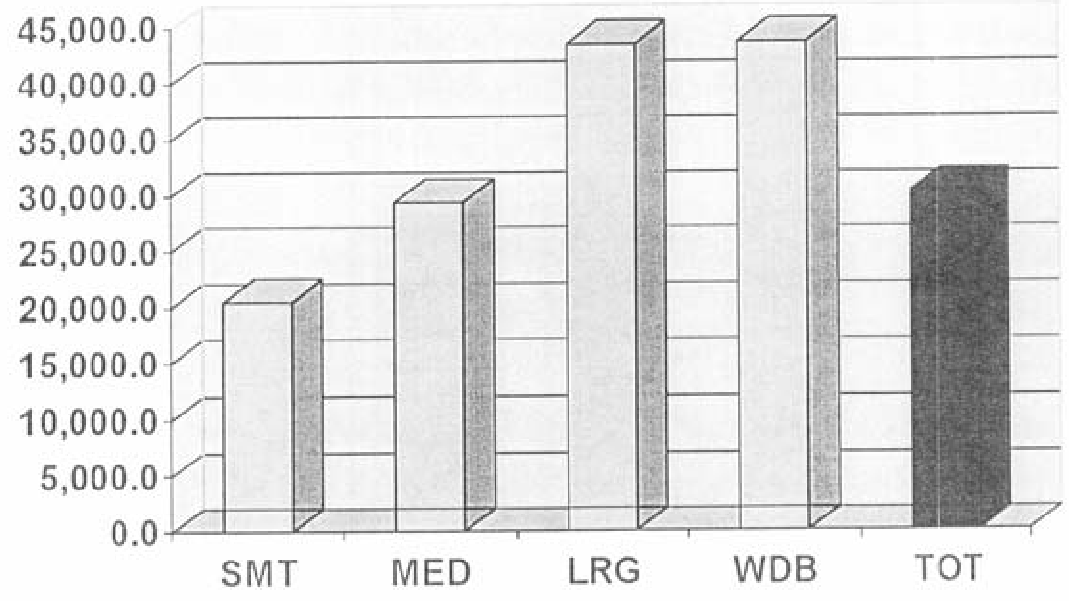


Estimated Air Carrier Event Rates

Rushed Approach Due to ATC

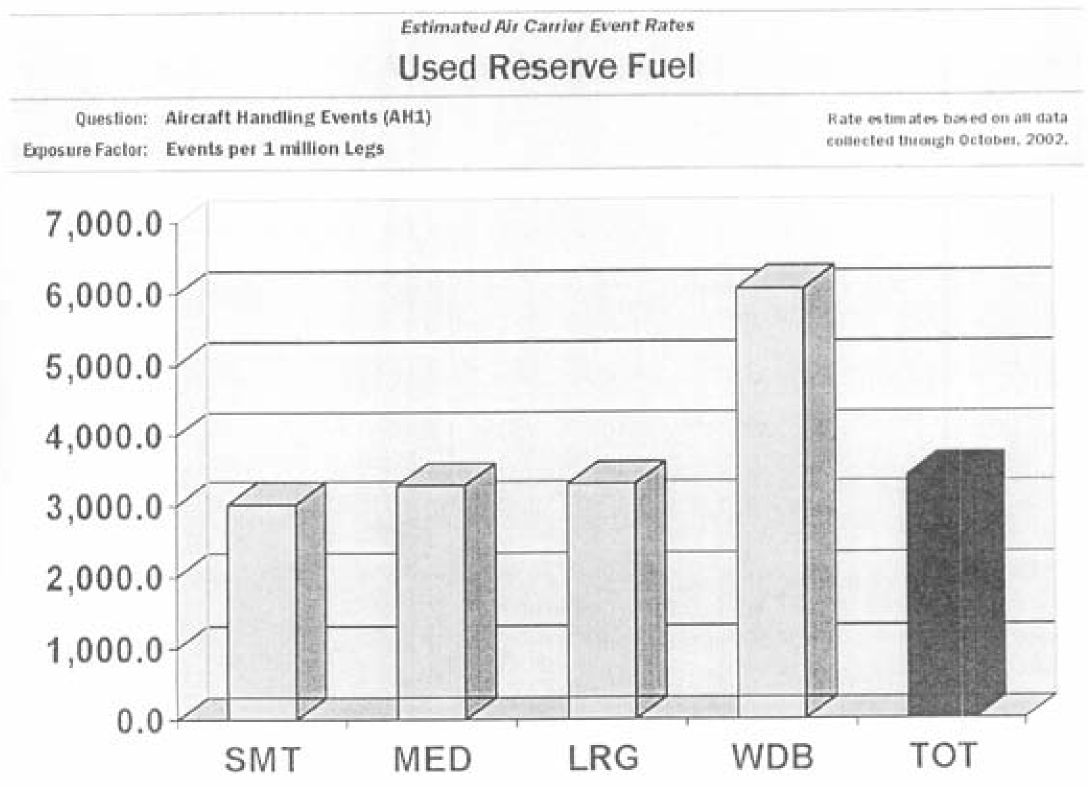
Question: ATC-Interaction Events (AT2)
Exposure Factor: Events per 1 million Legs

Rate estimates based on all data collected through October, 2002.



Aircraft Handling

Miscellaneous questions relating to aircraft management and handling practices, and other matters.



Estimated Air Carrier Event Rates

Used Reserve Fuel

Question: **Aircraft Handling Events (AH1)**

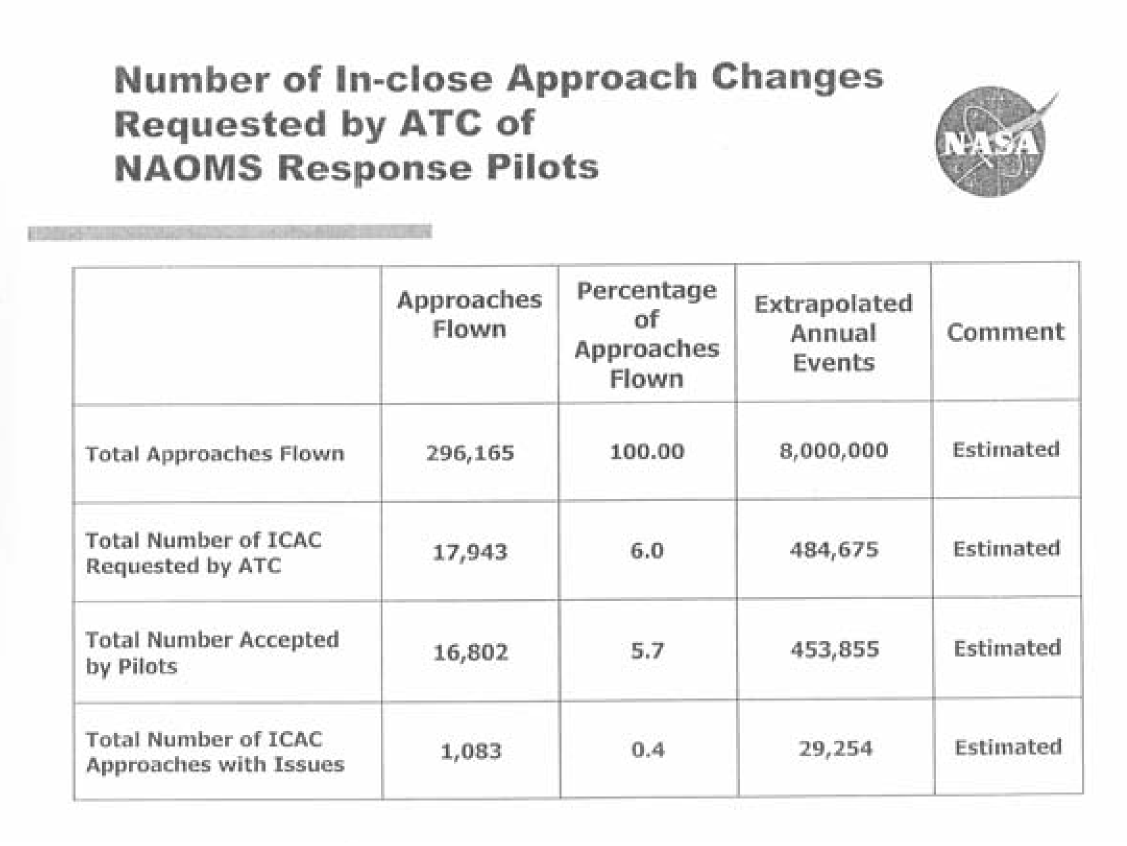
Exposure Factor: **Events per 1 million Legs**

Rate estimates based on all data collected through October, 2002.

In-Close Approach Change Results

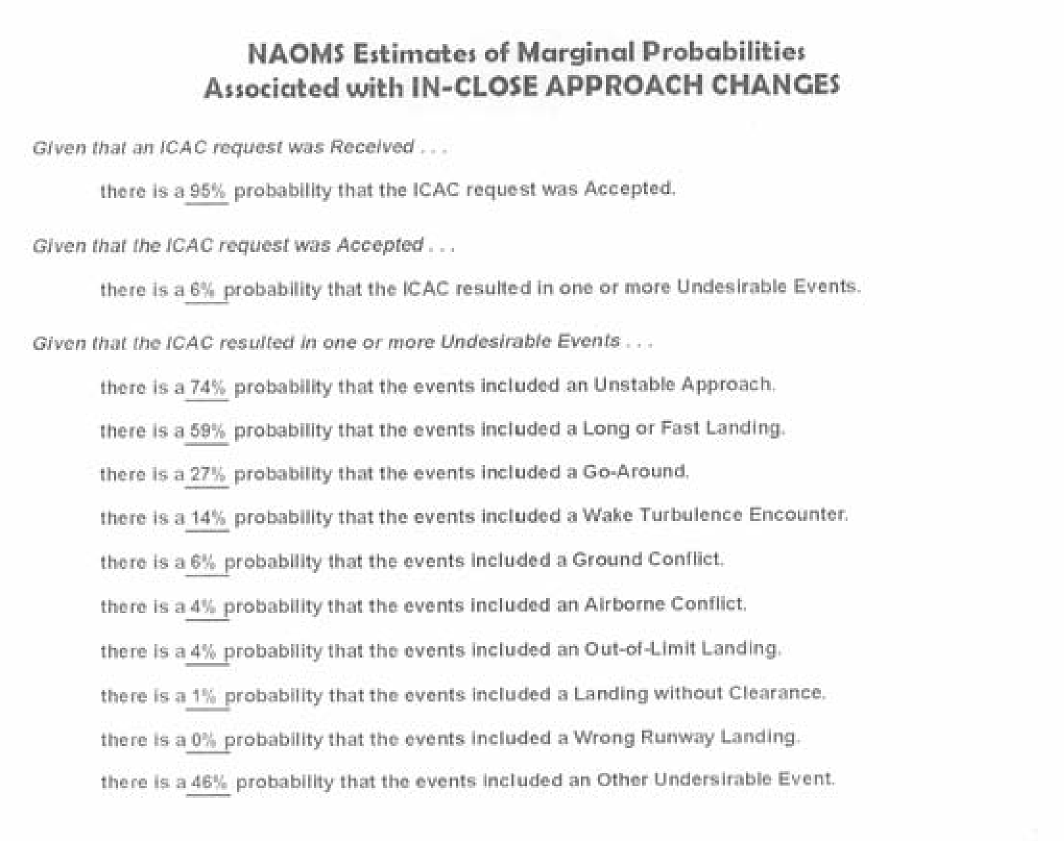
Section C: Special Topic – In-Close Approach Changes

- **Dynamics of approach clearance changes requested by ATC within ten-miles of a destination airport**
- **Sixteen questions relating to:**
  - Pilot execution of requested changes
  - Consequences
- **Questions focus on number of in-close approach change (ICAC) events**
- **Followed by additional questions concerning the last ICAC experienced by pilot**



Number of In-close Approach Changes Requested by ATC of NAOMS Response Pilots

	Approaches Flown	Percentage of Approaches Flown	Extrapolated Annual Events	Comment
Total Approaches Flown	296,165	100.00	8,000,000	Estimated
Total Number of ICAC Requested by ATC	17,943	6.0	484,675	Estimated
Total Number Accepted by Pilots	16,802	5.7	453,855	Estimated
Total Number of ICAC Approaches with Issues	1,083	0.4	29,254	Estimated



NAOMS Estimates of Marginal Probabilities Associated with IN-CLOSE APPROACH CHANGES

Given that an ICAC request was Received . . .

there is a 95% probability that the ICAC request was Accepted.

Given that the ICAC request was Accepted . . .

there is a 6% probability that the ICAC resulted in one or more Undesirable Events.

Given that the ICAC resulted in one or more Undesirable Events . . .

there is a 74% probability that the events included an Unstable Approach.

there is a 59% probability that the events included a Long or Fast Landing.

there is a 27% probability that the events included a Go-Around.

there is a 14% probability that the events included a Wake Turbulence Encounter.

there is a 6% probability that the events included a Ground Conflict.

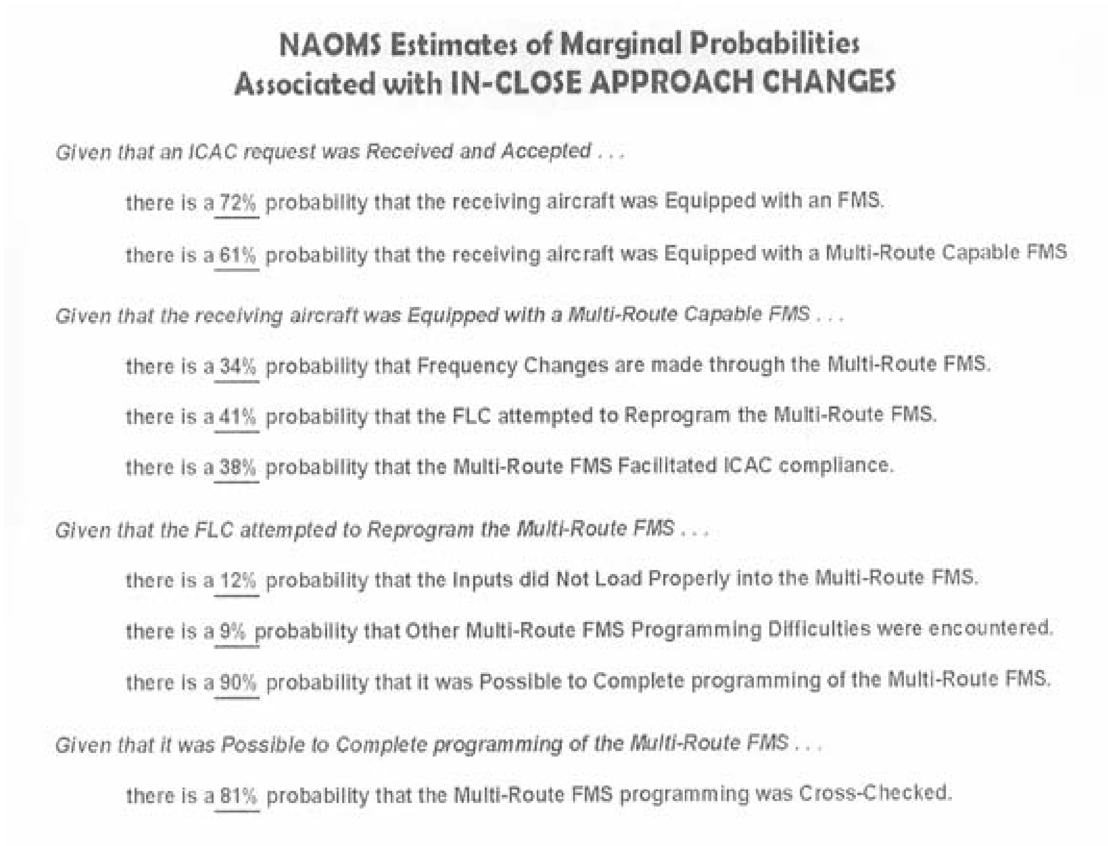
there is a 4% probability that the events included an Airborne Conflict.

there is a 4% probability that the events included an Out-of-Limit Landing.

there is a 1% probability that the events included a Landing without Clearance.

there is a 0% probability that the events included a Wrong Runway Landing.

there is a 46% probability that the events included an Other Undersirable Event.



NAOMS Estimates of Marginal Probabilities Associated with IN-CLOSE APPROACH CHANGES

Given that an ICAC request was Received and Accepted . . .

there is a 72% probability that the receiving aircraft was Equipped with an FMS.

there is a 61% probability that the receiving aircraft was Equipped with a Multi-Route Capable FMS

Given that the receiving aircraft was Equipped with a Multi-Route Capable FMS . . .

there is a 34% probability that Frequency Changes are made through the Multi-Route FMS.

there is a 41% probability that the FLC attempted to Reprogram the Multi-Route FMS.

there is a 38% probability that the Multi-Route FMS Facilitated ICAC compliance.

Given that the FLC attempted to Reprogram the Multi-Route FMS . . .

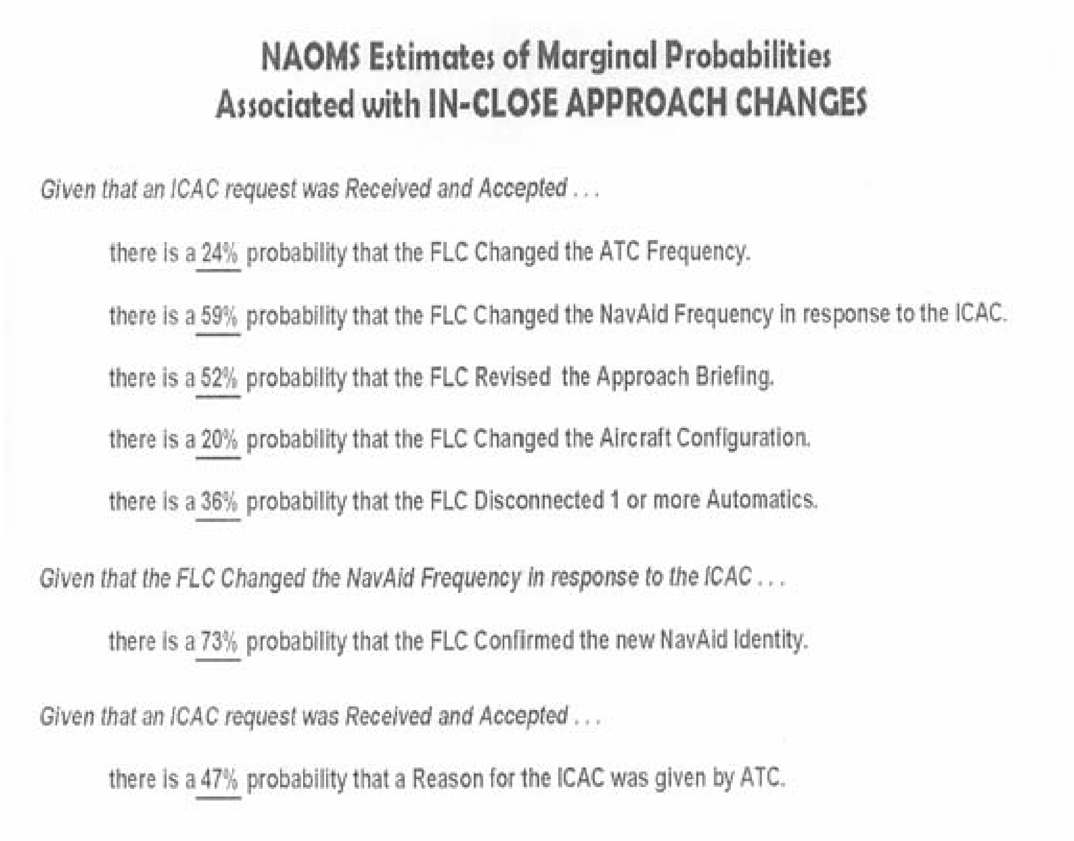
there is a 12% probability that the Inputs did Not Load Properly into the Multi-Route FMS.

there is a 9% probability that Other Multi-Route FMS Programming Difficulties were encountered.

there is a 90% probability that it was Possible to Complete programming of the Multi-Route FMS.

Given that it was Possible to Complete programming of the Multi-Route FMS . . .

there is a 81% probability that the Multi-Route FMS programming was Cross-Checked.



NAOMS Estimates of Marginal Probabilities Associated with IN-CLOSE APPROACH CHANGES

Given that an ICAC request was Received and Accepted . . .

there is a 24% probability that the FLC Changed the ATC Frequency.

there is a 59% probability that the FLC Changed the NavAid Frequency in response to the ICAC.

there is a 52% probability that the FLC Revised the Approach Briefing.

there is a 20% probability that the FLC Changed the Aircraft Configuration.

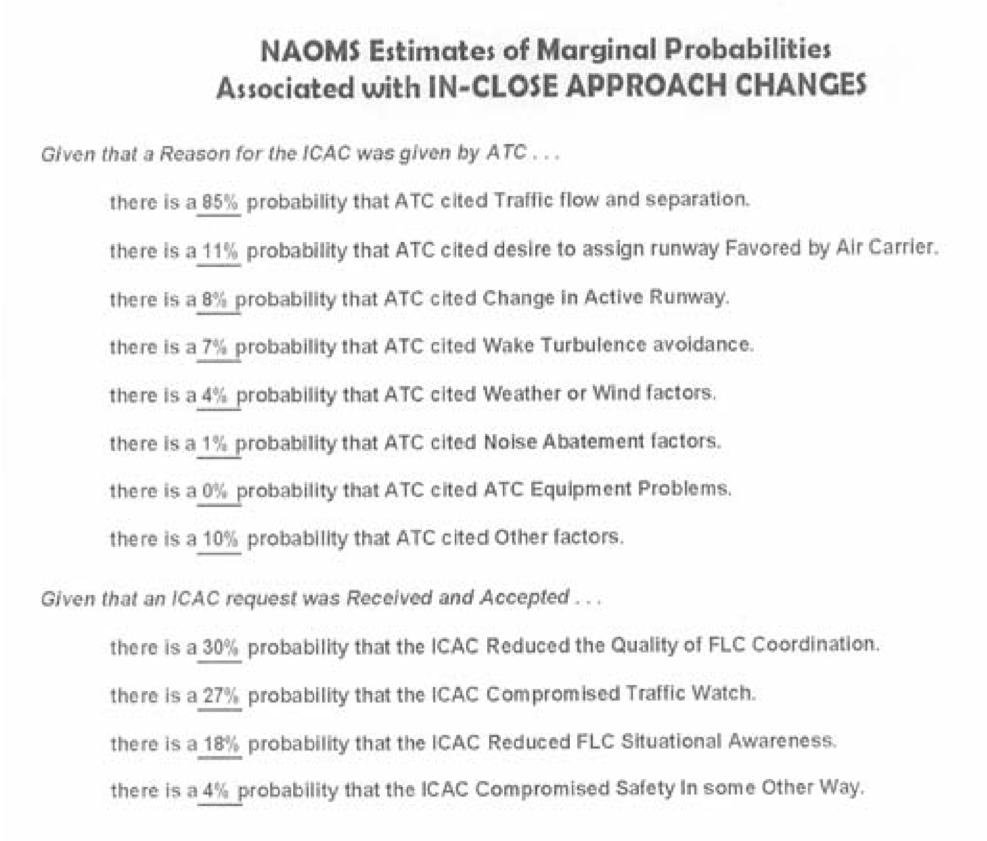
there is a 36% probability that the FLC Disconnected 1 or more Automatics.

Given that the FLC Changed the NavAid Frequency in response to the ICAC . . .

there is a 73% probability that the FLC Confirmed the new NavAid Identity.

Given that an ICAC request was Received and Accepted . . .

there is a 47% probability that a Reason for the ICAC was given by ATC.



NAOMS Estimates of Marginal Probabilities Associated with IN-CLOSE APPROACH CHANGES

Given that a Reason for the ICAC was given by ATC . . .

there is a 85% probability that ATC cited Traffic flow and separation.

there is a 11% probability that ATC cited desire to assign runway Favored by Air Carrier.

there is a 8% probability that ATC cited Change in Active Runway.

there is a 7% probability that ATC cited Wake Turbulence avoidance.

there is a 4% probability that ATC cited Weather or Wind factors.

there is a 1% probability that ATC cited Noise Abatement factors.

there is a 0% probability that ATC cited ATC Equipment Problems.

there is a 10% probability that ATC cited Other factors.

Given that an ICAC request was Received and Accepted . . .

there is a 30% probability that the ICAC Reduced the Quality of FLC Coordination.

there is a 27% probability that the ICAC Compromised Traffic Watch.

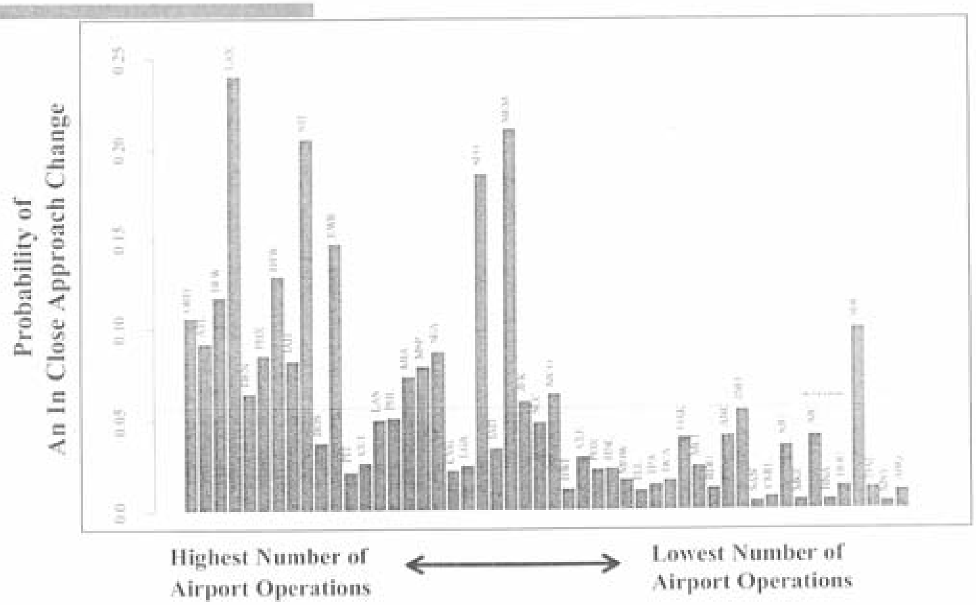
there is a 18% probability that the ICAC Reduced FLC Situational Awareness.

there is a 4% probability that the ICAC Compromised Safety In some Other Way.

Issues Associated with In-Close Approach Changes

Type of ICAC Problem	Number Reported	Percentage of Itemized Problems	Extrapolated Annual Events
Unstablilized Approach	631	3.76	17,045
Long/Fast Landing	561	3.52	15,964
Wake Turbulence	213	1.27	5,754
Missed Approach	211	1.26	5,700
Ground Conflict	52	0.31	1,405
Airborne Conflict	50	0.30	1,350
Out of Limit Winds	33	0.20	891
Landing without Clearance	7	0.04	189
Other	479	2.85	12,939

In-Close Approach Change Probability for the 50 Busiest US Airport



General Aviation Survey

Mary Connors

General Aviation Interviewing Effort

- **Yearly interviewing effort**
  - Sample size (N = ~23,800)
  - Screening (N = ~15,000)
  - Interview (N = 8,000)
  - Interview length averages 27 minutes
- **Progress to date (13 weeks)**
  - 2,000 completed interviews

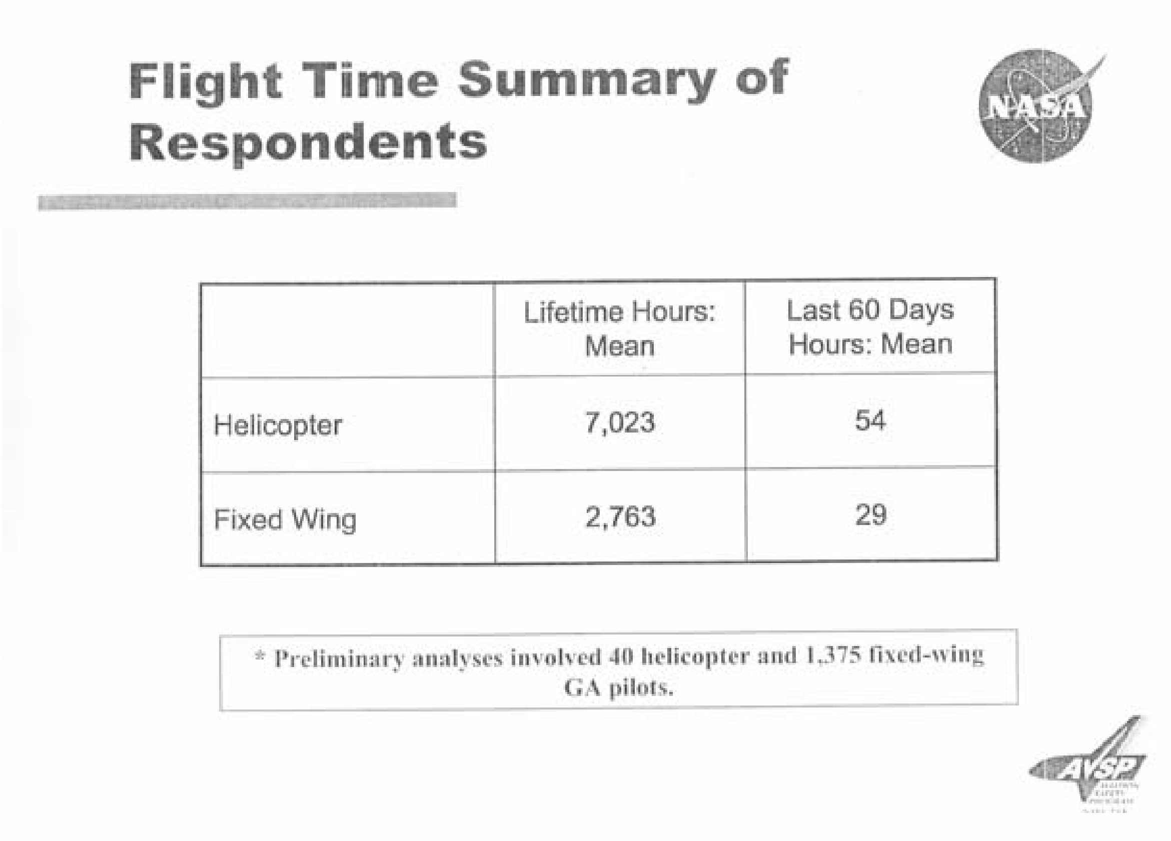
General Aviation Interviewing

- Too early to predict final outcomes
- Initial location efforts seem to indicate that when compared with air carrier pilots, GA pilots difficult to locate
- Once located, it takes more effort to get a completed interview
- Although refusal rate is not high yet, it is higher than AC rate after same period of time

General Aviation Questionnaire Structure*

- **Section A: Descriptive Demographic Information**
  Information suitable for exposure determination
- **Section B: Safety Related Events**
  Consistent data set over time
- **Section C: Focus Questions**
  Specific topics driven by government/industry high-priority needs
- **Section D: Questionnaire Feedback**

* Data collection started August, 2002; over 2,000 completed interviews to date; analysis based on 1,425 interviews



Flight Time Summary of Respondents

	Lifetime Hours: Mean	Last 60 Days Hours: Mean
Helicopter	7,023	54
Fixed Wing	2,763	29

* Preliminary analyses involved 40 helicopter and 1,375 fixed-wing GA pilots.

Distribution of Flight Activity

	Helicopter *	Fixed Wing *
Flight Instructor	6.9 %	13.5 %
Student	1.3 %	5.5 %
Corporate Pilot	1.8 %	15.4 %
Personal Business	2.1 %	12.3 %
Public Use	13.4 %	3.0 %
Revenue Passengers	38.3 %	8.9 %
Cargo Transport	4.9 %	4.1 %
Air Medical	14.0 %	1.5 %
Recreational	1.8 %	32.2%

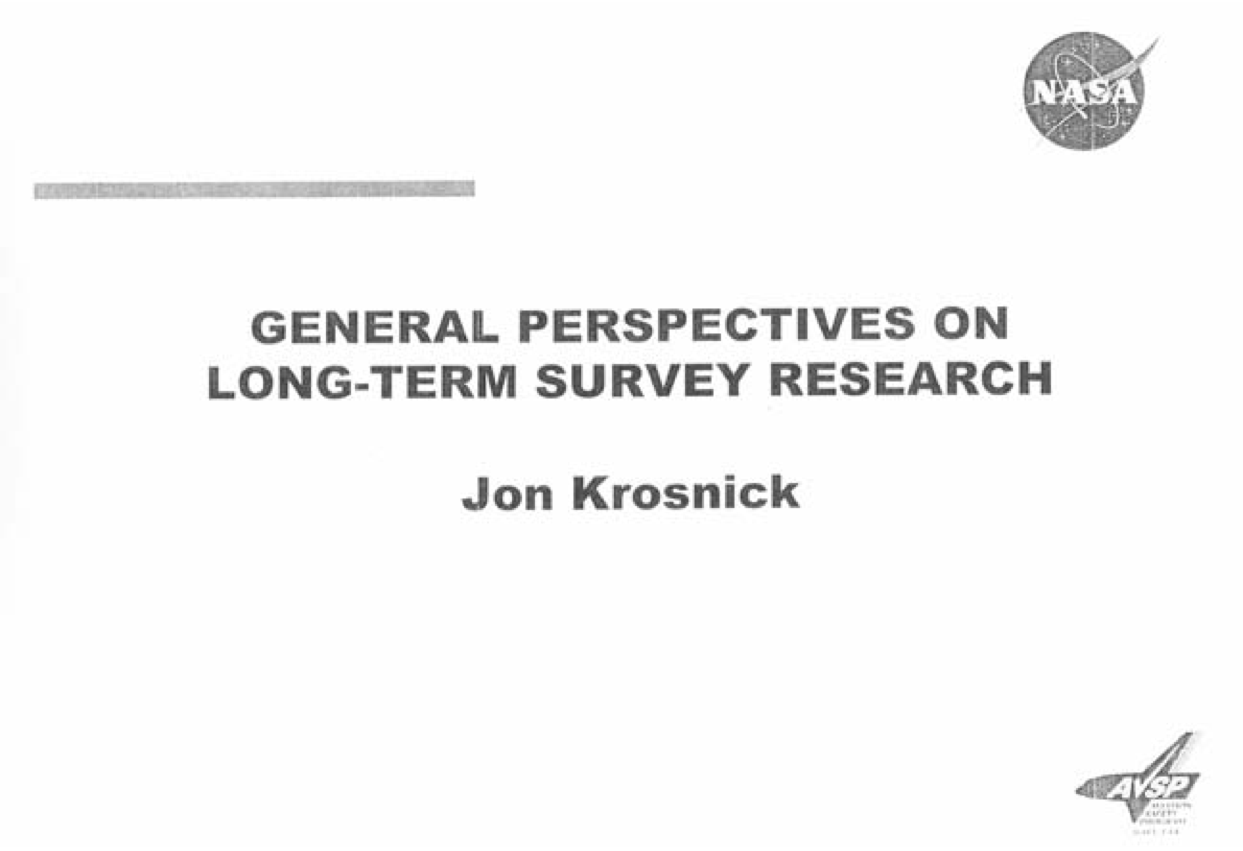
* Categories are not mutually exclusive

Event Indications for General Aviation

- Preliminary data analysis begun
- Data volume still too low for detailed analysis
- But, certain events suggest a higher level of occurrence than anticipated
  - Inadvertently entering airspace without clearance
  - Attitude Indicator Failures, some under IMC

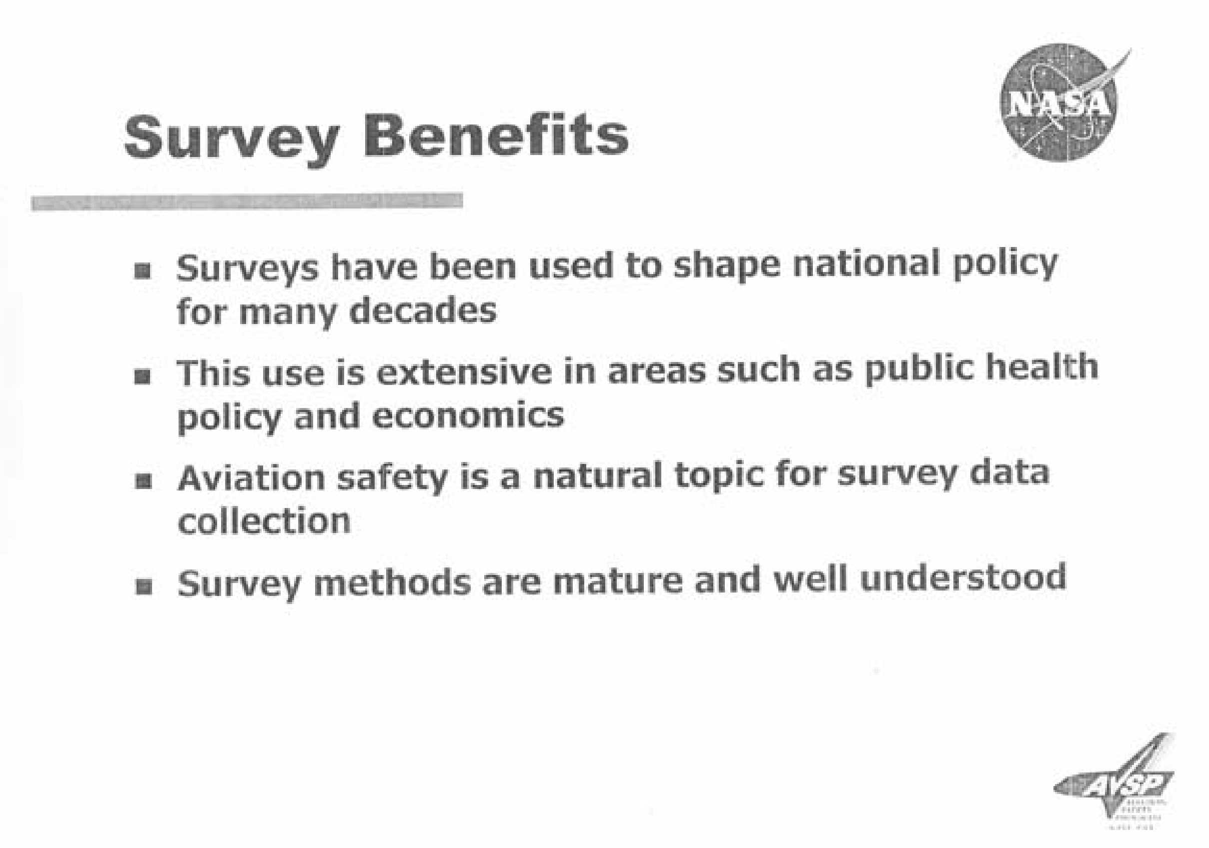
Earmarked Congressional Funds

- **500 helicopter and 500 corporate pilots surveyed with earmarked congressional funds**
  - Interviews just completed
  - Preliminary analyses just begun
- **The broader GA survey confirms**
  - Both helicopter pilots and corporate pilots are infrequently captured in the randomly-selected general aviation survey
  - These groups would require further focused investigation if further information is desired in the near term.



GENERAL PERSPECTIVES ON LONG-TERM SURVEY RESEARCH

Jon Krosnick

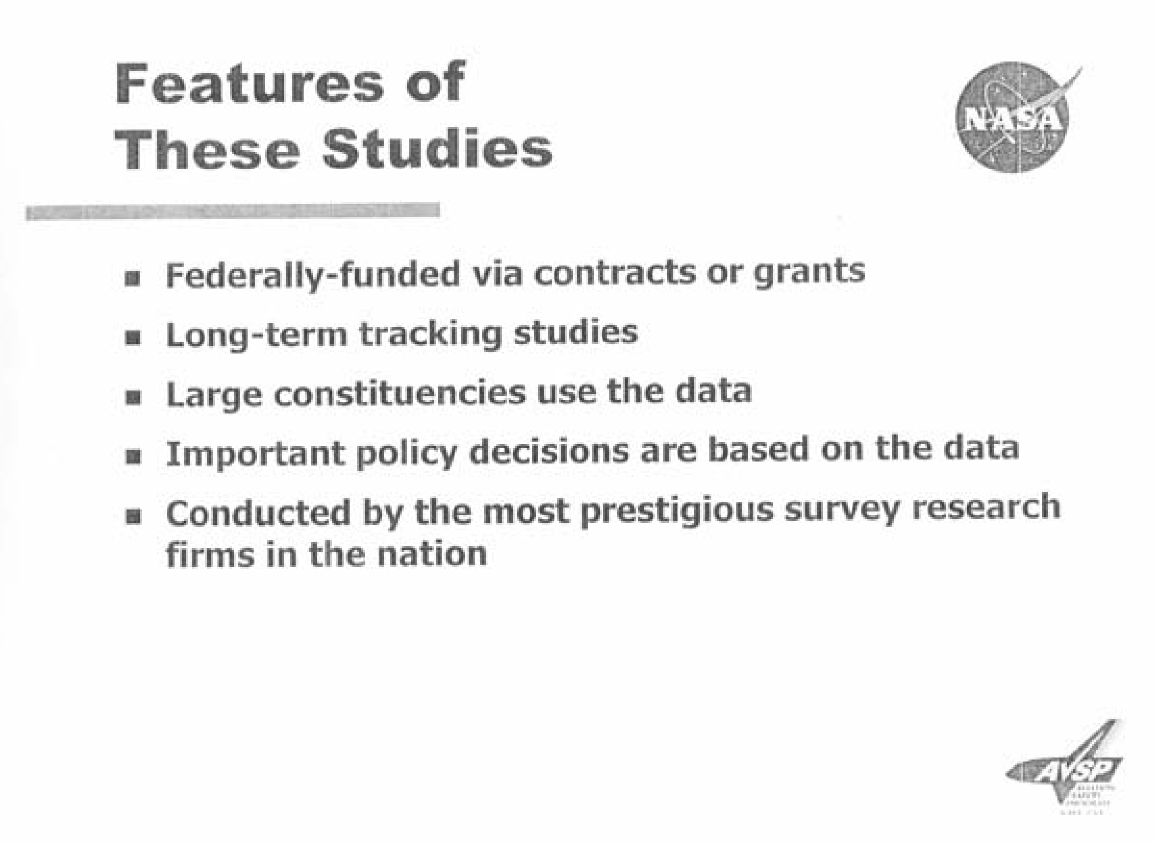


Survey Benefits

- Surveys have been used to shape national policy for many decades
- This use is extensive in areas such as public health policy and economics
- Aviation safety is a natural topic for survey data collection
- Survey methods are mature and well understood

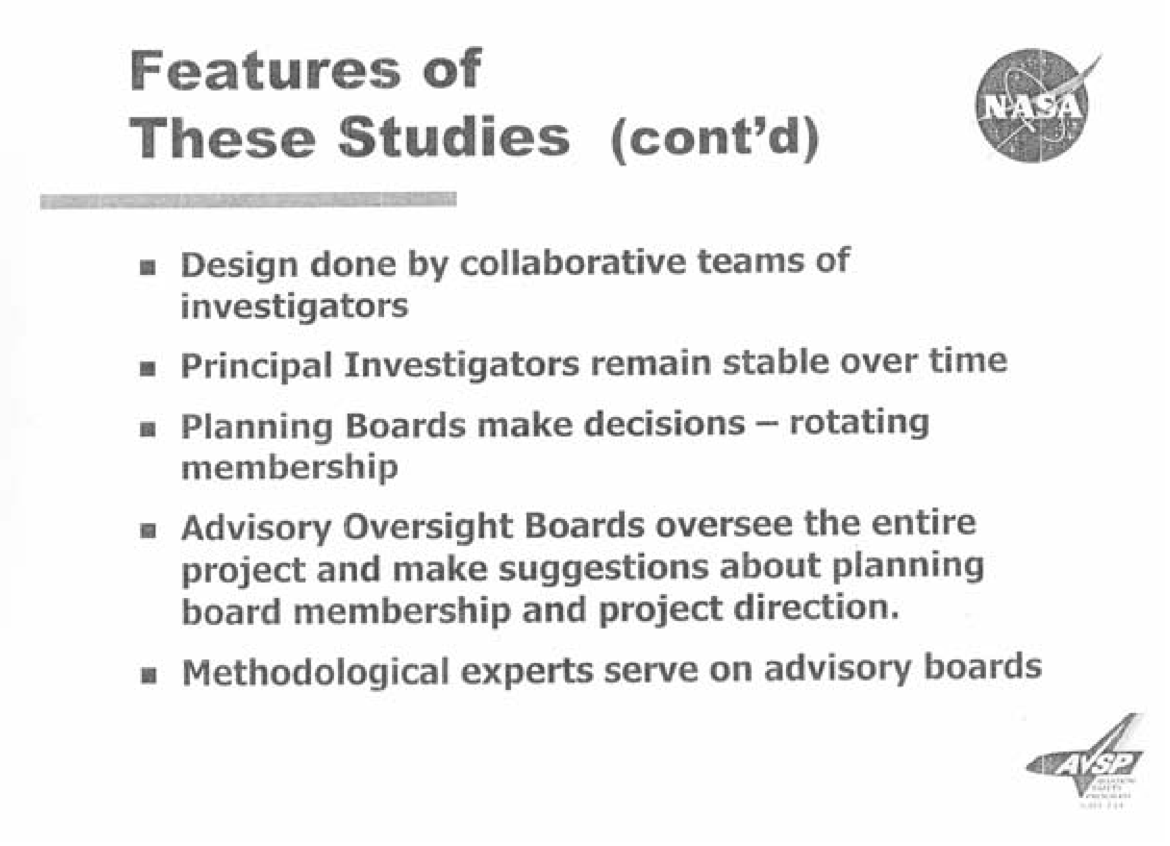
Examples of Continuing Surveys

- Survey of Income and Program Participation (Census Bureau) 1984 -
- Consumer Expenditure Surveys (Census Bureau) 1968 -
- Annual Housing Surveys (Census Bureau) 1973 -
- Survey of Consumer Attitudes (NSF) 1953 –
- Health and Nutrition Examination Surveys (NCHS) 1959 -
- National Health Interview Surveys (NCHS) 1970 -
- American National Election Studies (NSF) 1948 -
- Panel Study of Income Dynamics (NSF) 1968 –
- National Longitudinal Surveys (BLS) 1964 -
- Behavioral Risk Factor Surveillance System (CDC) 1984 –
- Monitoring the Future (NIDA) 1975 -



Features of These Studies

- Federally-funded via contracts or grants
- Long-term tracking studies
- Large constituencies use the data
- Important policy decisions are based on the data
- Conducted by the most prestigious survey research firms in the nation



Features of These Studies (cont'd)

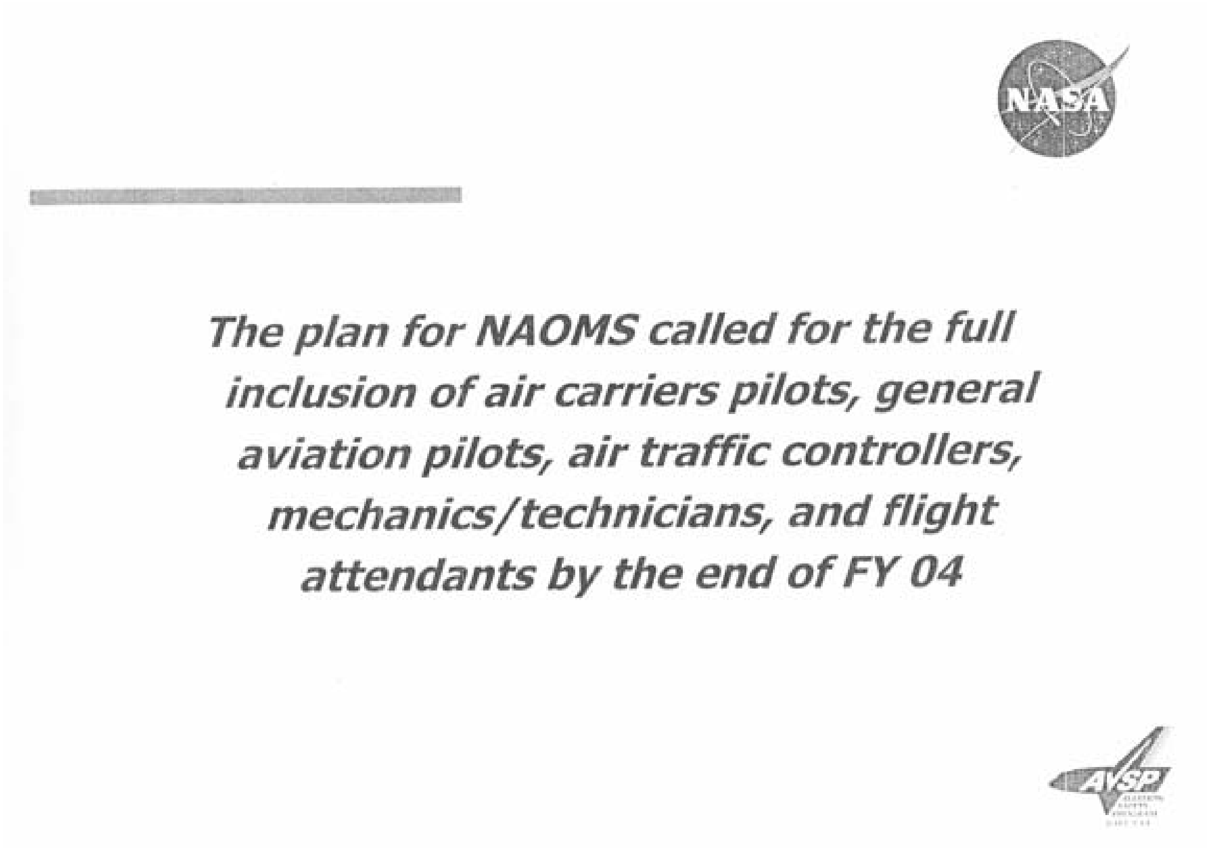
- Design done by collaborative teams of investigators
- Principal Investigators remain stable over time
- Planning Boards make decisions – rotating membership
- Advisory Oversight Boards oversee the entire project and make suggestions about planning board membership and project direction.
- Methodological experts serve on advisory boards

Features of These Studies (cont'd)

- Questionnaires have core items that remain constant from wave to wave
- Topical questions are rotated into and out of the questionnaire to reflect current interests
- Press releases and press conferences mark the release of new data (e.g., once a year)
- Publications by the project staff summarize a simple set of core trend findings
- Information is released to the public
- Information forms basis for follow-on studies

OUTREACH AND COMMUNITY INFORMATION

Linda Connell



The plan for NAOMS called for the full inclusion of air carriers pilots, general aviation pilots, air traffic controllers, mechanics/technicians, and flight attendants by the end of FY 04

Products

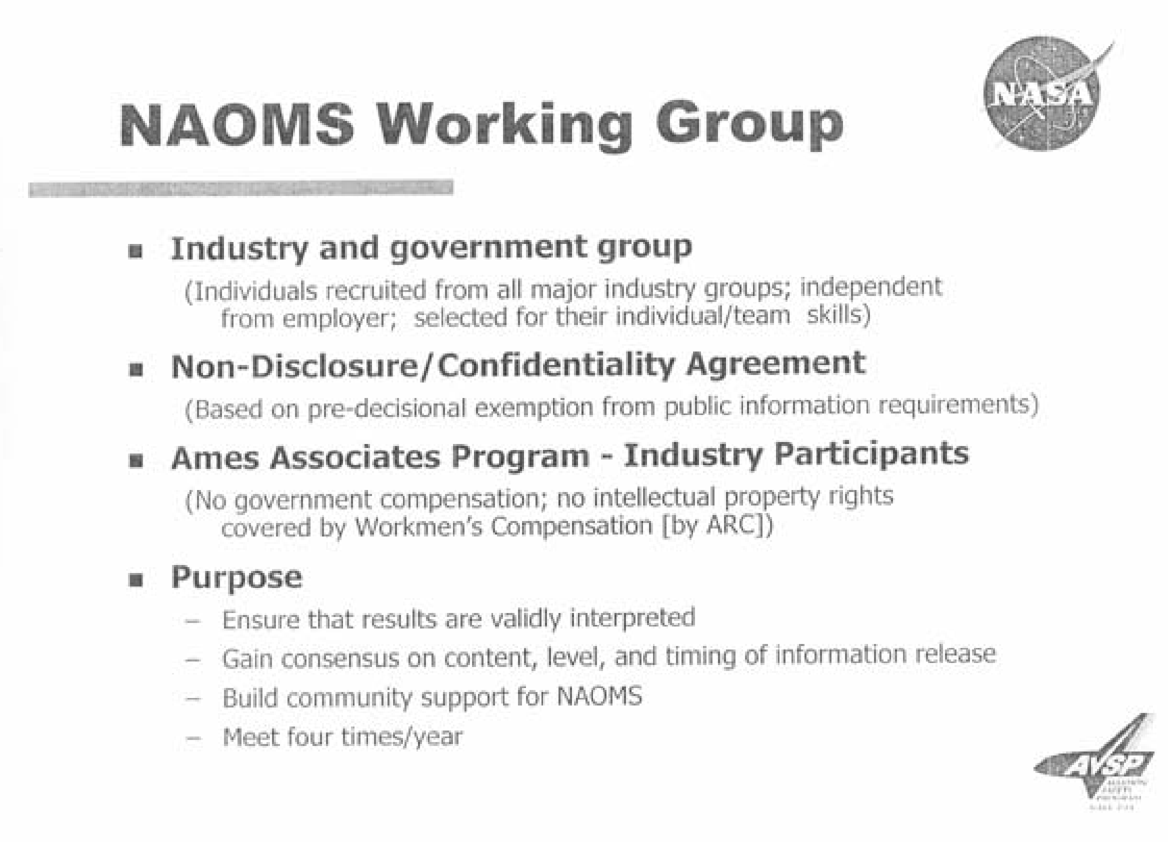
- **OUTPUTS**
  - Summarized aviation operational experience data
  - Statistically reliable estimates of incident rates
  - Identification/tracking of safety trends
  - Near real-time feedback on impacts of new technology and procedures
  - Support for data-driven safety agendas

- **PRODUCT CONSUMERS**
  - Decision makers (government and industry)
  - Safety professionals and research organizations

Briefing Plans

- **December 02 - AvSSP Program Office**
- **February 03 - NAOMS Working Group Kickoff**
- **February 03 – Report to ATAC Subcommittee (?), Code R/HQ (?)**
- **March 03 – Report to AvSSP Bi-Annual (?)**
- **Proposed Follow On:**
  - FAA - Office of System Safety, Flt. Standards, System Capacity, Other - March, 03
  - CAST - March, 03
  - Alphabet Groups, airlines, other - As can be arranged, March through June, 03

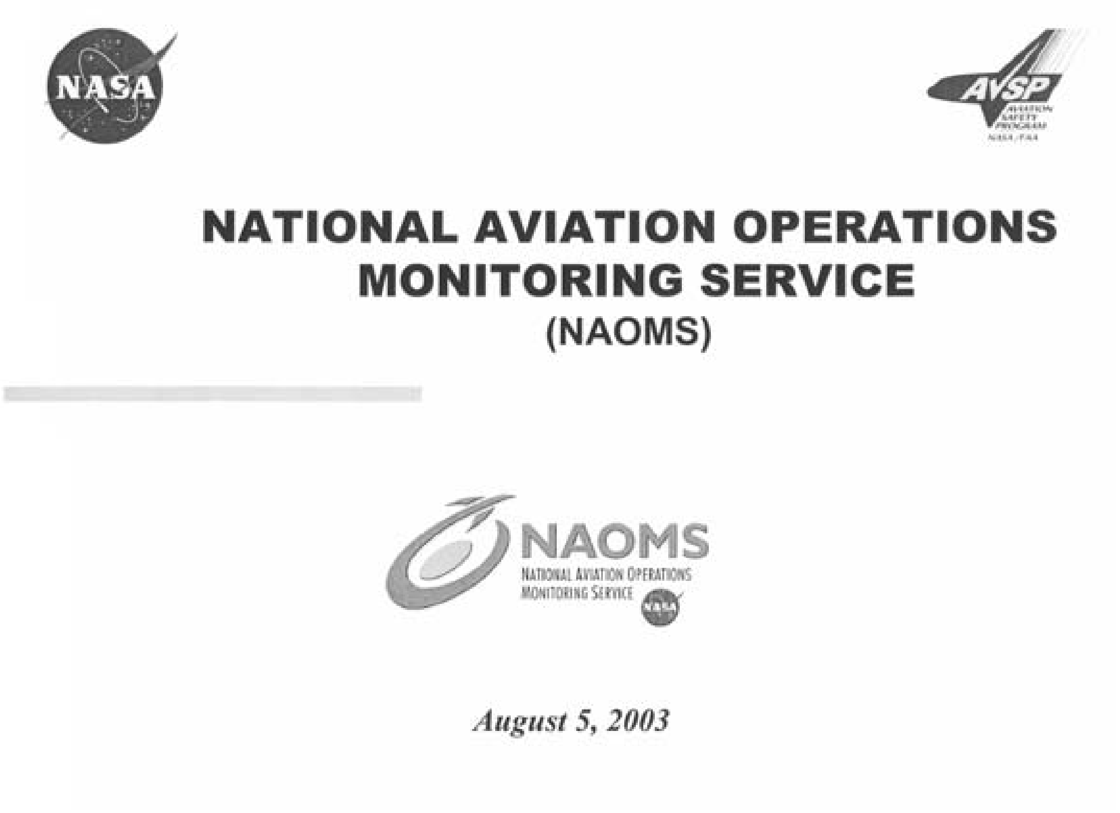
Permanent service possibilities will be explored in conjunction with briefing activities.



NAOMS Working Group

- **Industry and government group**
  (Individuals recruited from all major industry groups; independent from employer; selected for their individual/team skills)
- **Non-Disclosure/Confidentiality Agreement**
  (Based on pre-decisional exemption from public information requirements)
- **Ames Associates Program - Industry Participants**
  (No government compensation; no intellectual property rights covered by Workmen's Compensation [by ARC])
- **Purpose**
  - Ensure that results are validly interpreted
  - Gain consensus on content, level, and timing of information release
  - Build community support for NAOMS
  - Meet four times/year

Exhibit #9


NASA
AVSP
AVIATION SAFETY PROGRAM
NASA / FAA
NAOMS
NATIONAL AVIATION OPERATIONS
MONITORING SERVICE

NATIONAL AVIATION OPERATIONS MONITORING SERVICE
(NAOMS)

August 5, 2003

Purpose of Briefing

Precisely describe NAOMS development and purpose.

NAOMS Purpose

To fill an aviation safety data gap through the collection of primary and quantifiable safety data from pilots, air traffic controllers and others. The resulting data to be reliable, accurate and timely.

Foundation of NAOMS

- **A number of databases attempt to capture safety-related information concerning the National Airspace System**
- **A number of databases attempt to capture safety-related information concerning specific parts of the NAS**

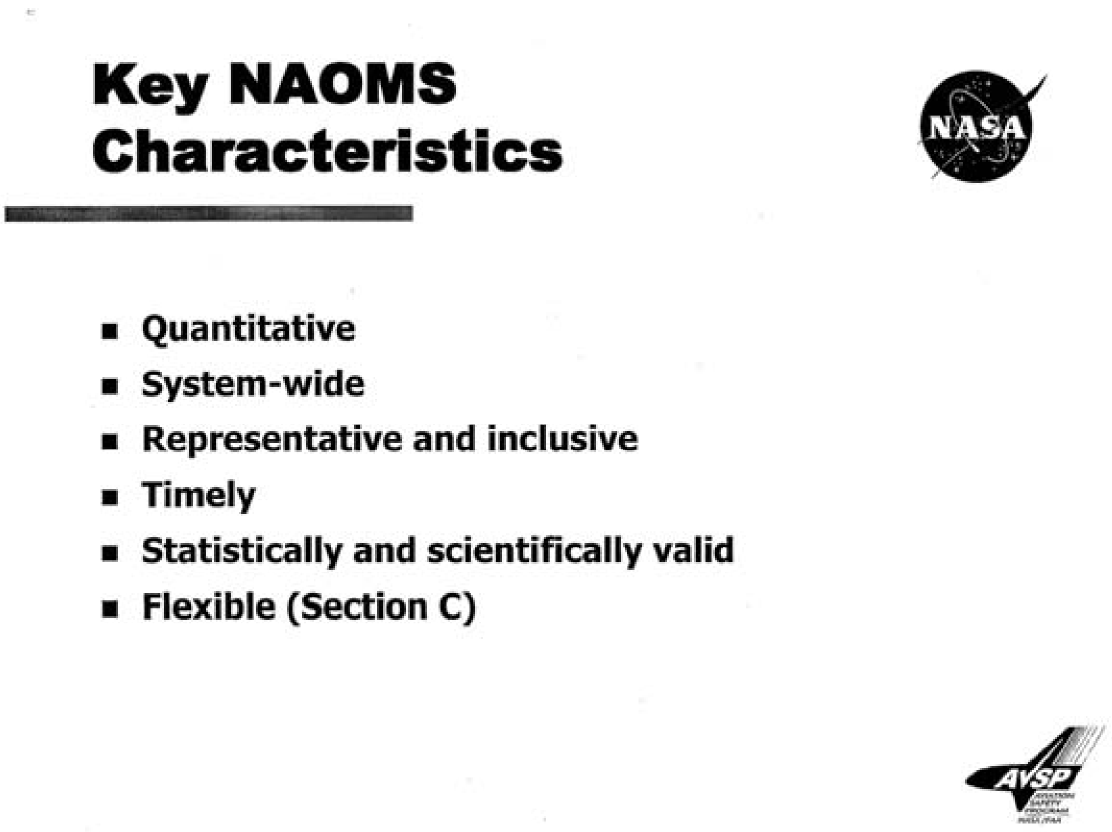
No existing database addresses the health and safety of the NAS as a whole in a quantitatively defensible fashion.

Expressed Need for Event Data

- Multiple and consistent recommendations for improvement in aviation safety data systems
  - White House Commission on Aviation Safety and Security ("Gore Report")
    - "Most effective way to identify incidents and problems in aviation is for the people who operate the system (pilots, mechanics, controllers, dispatchers, etc) to self-disclose the information." (Page 13)
  - GAO Evaluation (Safer Skies Review, June 2000)
    - Additional performance measures required (by law)
    - Use precursors associated with past accidents to track safety baseline and improvements from interventions
  - NTSB (Safety Report on Transportation Safety Databases, 2002)
    - Over 19 recommendations for improvements in safety event reporting (1968-2001)
    - Need to address problem of under-reporting in current aviation safety data systems
  - FAA (internal studies, 2004 Strategic Plan draft)
    - Identify risks before they lead to accidents

Survey Rationale

- Reliable and valid results
  - Must be designed and implemented according to established scientific protocols
  - Require high response rates
- Survey methodology widely used by industry and government policy makers
- Many Federal programs use data for safety and management decisions
  - DOT Omnibus Transportation Survey
    - Telephone, monthly, ongoing, all households, 1,000 interviews per month
  - National Household Travel Survey (NHTS)
    - Telephone, 40,000 households, every five years
  - Commodity Flow Survey
    - Telephone, shippers of domestic products, every five years, over 100 k sampled each time survey applied



Key NAOMS Characteristics

- Quantitative
- System-wide
- Representative and inclusive
- Timely
- Statistically and scientifically valid
- Flexible (Section C)

Goals

1. Track aviation safety trends
2. Monitor the impacts of technological and procedural changes to the aviation system
3. Encourage emphasis on areas where improvements could have the greatest impact
4. Contribute to the development of a data-driven basis for safety decisions
    - Through integration of findings through industry and government groups

Survey Approach

- Regularly survey pilots, controllers, mechanics, flight attendants and others who operate in the NAS
- View the national aviation system through their eyes (primary data)
- Includes all types of operations (air carrier, regional, corporate, general aviation)
- Collect data on events directly experienced by respondents
- Guarantee confidentiality
- Achieve scientific integrity by using well crafted survey instruments and statistical analysis methods

Focus

NAOMS measures event occurrence, not causes. Notable trends or findings require *additional* investigation.

NAOMS Team

NASA Managers

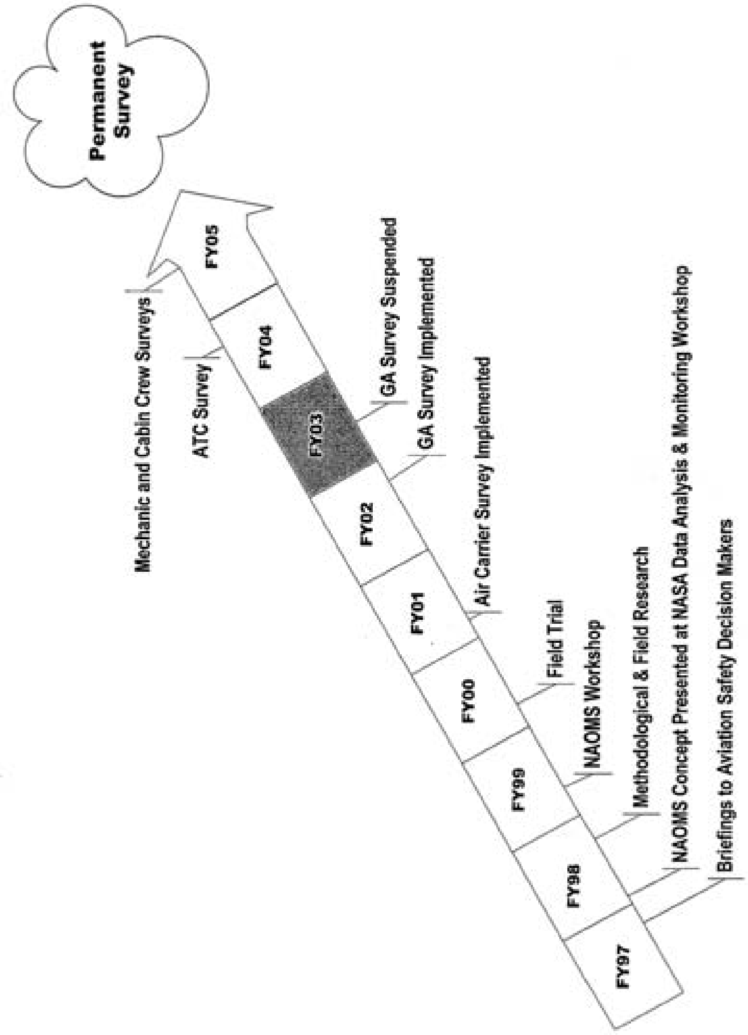
– **Mary Connors**	**AvSP, Level 3**
– **Linda Connell**	**AvSP, Level 3**

Battelle Support Service Contract to NASA

– **Loren Rosenthal**	**Battelle Manager**
– **Robert Dodd**	**Principal Investigator**
– **Jon Krosnick**	**Survey Methodologist**
– **Mike Silver**	**Survey Methodologist**
– **Joan Cwi**	**Survey Application**
– **T. Ferryman**	**Statistician**
– **Bruce Ellis**	**Statistician**
– **Mike Jobanek**	**Aviation Safety Analyst**

NAOMS Development

- **Initial program planning started in FY 1997**
- **Part of the NASA's AvSP program**
  - Method for evaluating impact of AvSP interventions
- **Extensive briefings and workshops to FAA and industry through all phases**
- **Development process and OMB approvals were comprehensive, rigorous and labor intensive**
  - Required Federal Register Notices (FRN)
- **Routine data collection began with air carrier pilots in April 2001**


FY97
FY98
FY99
FY00
FY01
FY02
FY03
FY04
FY05
Permanent Survey
Briefings to Aviation Safety Decision Makers
NAOMS Concept Presented at NASA Data Analysis & Monitoring Workshop
Methodological & Field Research
NAOMS Workshop
Field Trial
Air Carrier Survey Implemented
GA Survey Implemented
GA Survey Suspended
ATC Survey
Mechanic and Cabin Crew Surveys

NAOMS Development: Survey Content

- Reviewed literature, safety data systems and past surveys
  - ASRS, NTSB, AIDS, NAIMS, FOQA programs, other
  - 43 of 62 core questions associated with past air carrier accidents
- Conducted four ALPA supported focus groups
  - 36 active air carrier pilots
  - Gained insight into safety problems that concern active line pilots
  - Gained insight into their opinion of possible survey
- (Also conducted 3 NATCA sponsored focus groups with 27 controllers)

NAOMS Development: Organization and Form

- Conducted ALPA supported experimental research with active line pilots to determine
  - How well pilots remember (period of recall)
  - How pilots organized memory of safety events (questionnaire organization)
  - Survey "talk-aloud" tests (individual pilots provide real time criticism of questionnaire content and structure)
- Developed a draft survey that was
  - Extensively edited and corrected for non-technical wording by survey method experts
  - Edited and corrected for technical accuracy by aviation subject matter experts

Extensive and detailed up-front effort devoted to questionnaire development.

Pre-Field Trial Industry and Government Workshop

- **May 1999 – Pre Field Trial Workshop in Alexandria, VA**
- **Goals of workshop**
  - Described program and solicited input
  - Presented draft questionnaire and asked for comments
- **Participants**
  - Industry and government invited, 52 participants
  - All major organizations represented including FAA, NTSB, ALPA, ATA, etc
- **Comments**
  - Working groups developed for comments
  - Comments provided and summarized
  - FAA conducted internal survey and provided summary comments

NAOMS Development: Field Trial

- Survey was tested in a field trial among 630 active air carrier pilots to determine its suitability and to discover weaknesses or flaws
- Pilots in field trial were asked to provide input into areas that were unclear, needed improvement, or topics that should be dropped or added
- Findings from field trial used to further edit and revise questionnaire

Post-Field Trial Industry and Government Workshop

March 2000 – Post Field Trial Workshop in Washington D.C.

- **Goal of workshop**
  - Presented findings from field trial
  - Described next steps of program
  - Obtained additional input from industry and government organizations
- **Participants**
  - Industry and government invited, 39 participants
  - All major organizations represented including FAA, NTSB, ALPA, ATA, etc
- **Summary of results**
  - Comments provided and summarized

Survey Initiation

- **Air Transport Pilots initial group**
- **60-day recall period; telephone interviews**
- **8,000 interviews/year**
- **Questionnaire Content**
  - Section A - Demographics/experience
  - Section B - Core questions of study; consistent data set over time
  - Section C - Focused topics to be driven by government/industry high priority needs, changes over time
  - Section D - Questionnaire Feedback

Statistical Approach: Rate Development

- **Numerator: safety event counts**
- **Denominator: risk exposure**
  - Flight hours (events that can occur any time during flight)
  - Flight legs (events that occur mainly during terminal operations)
- **NAOMS collects data for the numerator (events) and denominator (exposure) at the same time**
- **Rates developed for aircraft size groups**
  - Small transport (<100 k# GTOW)
  - Medium transport (≥ 100 k# and < 200 k# GTOW)
  - Large transport (> 200 k# GTOW with single aisle)
  - Wide-body (> 200 k# GTOW with two aisles)
- **Confidence intervals are calculated for all rates**

Statistical Approach: Quality Assurance

- **NAOMS has QA checks during many steps during data collection and analysis process**
- **CATI (computer aided telephone interviewing) software used at data collection to minimize data entry errors**
  - Range checks on quantities
  - Valid value check on fixed fields
- **Second stage QA occurs during data processing**
  - Second validation check
  - Check for outliers (roughly 0.5% of data is unreasonable)
- **Additional review and calculation of results done by NAOMS team statisticians to verify analyses**

Statistical Approach: Future Directions

Future data products to be determined by guidance from the NAOMS working group

Status

- Air Carrier Pilots
  - Over 17,000 interviews
  - 70% response rate
  - Interviews continue
- Over 4,000 interviews with General Aviation Pilots
  - Presently suspended
- Air Traffic Controller Survey scheduled for startup in FY- 04

NAOMS Working Group

- Purpose
  - Ensure that all aspects of the NAOMS are and continue to be properly implemented and that results are valid and appropriate
  - Gain agreement concerning information release in terms of content, level, form, and timing
- Industry and Government Groups
  - Individuals recruited from all major industry and government; selected for their individual/team skills
- Non-Disclosure/Confidentiality Agreement
- Ames Associates Program - Industry Participants
  - No government compensation, no intellectual property rights covered by Workmen's Compensation [by ARC]

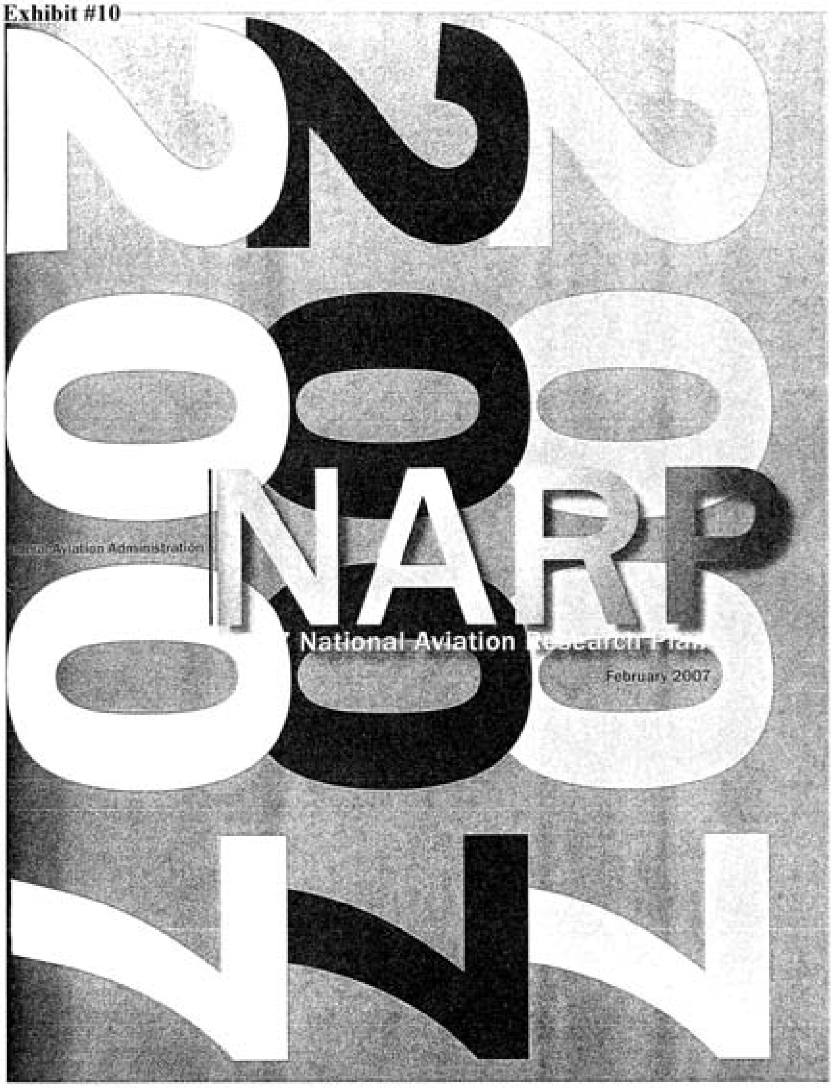
Summary

- NAOMS measures the occurrence of events, not causes
- It is intended to serve the aviation industry as a whole
- The NAOMS survey is designed to expose areas that need further investigation
- Numerous briefings and workshops have been conducted with the aviation community
- Over 17,000 air carrier pilot surveys have been completed
- NAOMS meets the goal of a quantitative, statistically defensible, system-wide safety assessment tool, complementing other databases and assessment tools

FAA Participation

- Elements of the FAA have been involved in the NAOMS process from the beginning and at various stages in its development
- NASA has invited 2-3 FAA representatives serve on the NAOMS Working Group
- Encourage others within their organization to provide feedback through the NAOMS Working Group
- Lend support to NAOMS ATC survey effort
- Determine how the NAOMS results can best be used to support the FAA safety mission.

Exhibit #10



Federal Aviation Administration

NARP

National Aviation Research Plan

February 2007

R&D ACTIVITIES

Information Analysis and Sharing

Develop an information management system to serve as the foundation for the analysis of data trends and the identification of potential safety hazards before accidents occur.

2009: Evaluate current protection and assurance models and potential conflicts with privacy and consumer advocacy groups. (JPDO OI #69)[17] / (JPDO, Aviation Safety Risk Analysis)(118)

2012: Validate the Net Enabled Operations (NEO) Architecture proof-of-concept for the sharing of aviation safety information among JPDO member agencies. (JPDO OI #69) / (Aviation Safety Risk Analysis)(118)

2013: Complete the NGATS Aviation Safety Information Analysis and Sharing (ASIAS) Phase 1 pre-implementation activities, including concept definition. (JPDO OI #69) / (JPDO, Aviation Safety Risk Analysis)(118)

Develop a system to increase safety of commercial operations.

2011: Develop automated tools to monitor databases for potential safety issues. (Aviation Safety Risk Analysis)

2012: Demonstrate a working prototype of network based integration of information extracted from diverse, distributed sources. (Aviation Safety Risk Analysis)

Safety Management System

Produce guidelines for developing processes and technologies to implement a safety management system.

2011: Develop proof of concept for NextGen including a prototype to implement on a trial basis with selected participants that involve a cross-section of air service providers. (JPDO OI #71, 72, 73) / (Aviation Safety Risk Analysis)(118)

2011: Complete study of risk-based fleet management for small-airplane continued operational safety. (JPDO OI #68) (Aging Aircraft)

2012: Develop risk management concepts, models, and tools for unmanned aircraft systems. (JPDO OI #68) (Unmanned Aircraft Systems Research)

2012: Develop risk management concepts, models, and tools for transport category airplanes. (JPDO OI #68) (Aviation Safety Risk Analysis)

2014: Demonstrate a National Level System Safety Assessment capability that will proactively identify emerging risk across the NextGen. (JPDO OI #71, 72, 73)/ (JPDO, Aviation Safety Risk Analysis)(118)

Safety evaluation

Develop method and metrics to measure progress in reducing the rate of fatalities and significant injuries by two-thirds.[18]
(Aviation Safety Risk Analysis)

2010: Demonstrate a one-third reduction in the rate of fatalities and injuries.

2012: Demonstrate a one-half reduction in the rate of fatalities and injuries.

2015: Demonstrate a two-thirds reduction in the rate of fatalities and injuries.

Capacity evaluation

Develop method, metrics, and models to demonstrate that the system can handle growth in demand up to three times current levels.[19]
(JPDO, CAASD, Operations Concept Validation,(152) System Capacity Planning and Improvement, Airspace Management Laboratory, Airspace Redesign)

2008: Demonstrate capacity increase to 130% current levels.
2010: Demonstrate capacity increase to 166% current levels.
2012: Demonstrate capacity increase to 230% current levels.
2015: Demonstrate capacity increase to 300% current levels.

Environmental evaluation

Develop method, metrics, and models to demonstrate that aviation noise and emissions can be significantly reduced in absolute terms to enable the air traffic system to handle growth in demand up to three times current levels.[20]
(Environment and Energy,(151) JPDO, CAASD, Operations Concept Validation)

2008: Demonstrate no environmental restrictions at 130% capacity.

2010: Demonstrate no environmental restrictions at 166% capacity.

2012: Demonstrate no environmental restrictions at 230% capacity.

2015: Demonstrate no environmental restrictions at 300% capacity.

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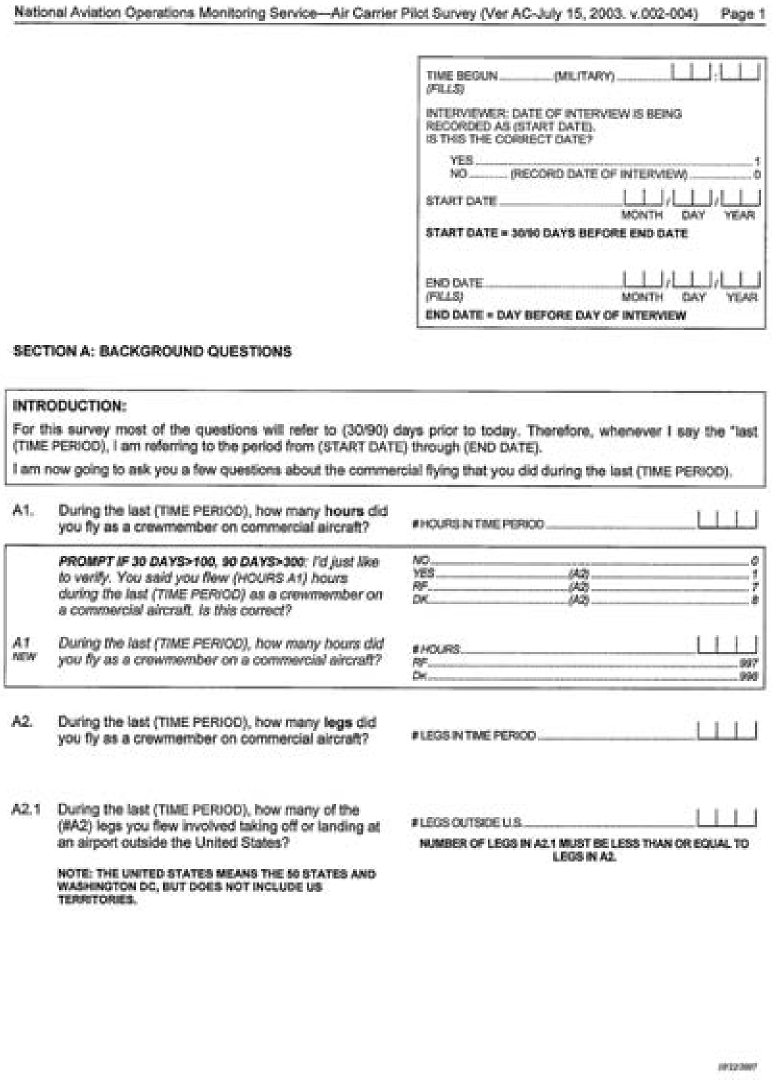
[17] Operational Improvement numbers are from the draft JPDO release on June 2006.
[18] This supports demonstration of the 2013 milestone under the human protection goal.
[19] This supports demonstration of the 2013 milestone under the fast, flexible, and efficient goal.
[20] This supports demonstration of the 2013 milestone under the clean and quiet goal as it applies to the 2013 milestone under the fast, flexible, and efficient goal.

Exhibit #11



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TIME BEGUN .... (MILITARY) .... ⎿⏊⏌:⎿⏊⏌
(FILLS)

INTERVIEWER: DATE OF INTERVIEW IS BEING RECORDED AS (START DATE).
IS THIS THE CORRECT DATE?

YES 1
NO .... (RECORD DATE OF INTERVIEW) 0

START DATE .... ⎿⏊⏌/⎿⏊⏌/⎿⏊⏌
MONTH DAY YEAR

START DATE = 30/90 DAYS BEFORE END DATE

END DATE .... ⎿⏊⏌/⎿⏊⏌/⎿⏊⏌
(FILLS) MONTH DAY YEAR

END DATE = DAY BEFORE DAY OF INTERVIEW

SECTION A: BACKGROUND QUESTIONS

INTRODUCTION:

For this survey most of the questions will refer to (30/90) days prior to today. Therefore, whenever I say the "last (TIME PERIOD), I am referring to the period from (START DATE) through (END DATE).

I am now going to ask you a few questions about the commercial flying that you did during the last (TIME PERIOD).

A1. During the last (TIME PERIOD), how many **hours** did you fly as a crewmember on commercial aircraft?

HOURS IN TIME PERIOD .... ⎿⏊⏊⏌

PROMPT IF 30 DAYS>100, 90 DAYS>300: *I'd just like to verify. You said you flew (HOURS A1) hours during the last (TIME PERIOD) as a crewmember on a commercial aircraft. Is this correct?*

NO 0
YES .... (A2) 1
RF .... (A2) 7
DK .... (A2) 8

A1 NEW *During the last (TIME PERIOD), how many hours did you fly as a crewmember on a commercial aircraft?*

# HOURS .... ⎿⏊⏊⏌
RF 997
DK 998

A2. During the last (TIME PERIOD), how many **legs** did you fly as a crewmember on commercial aircraft?

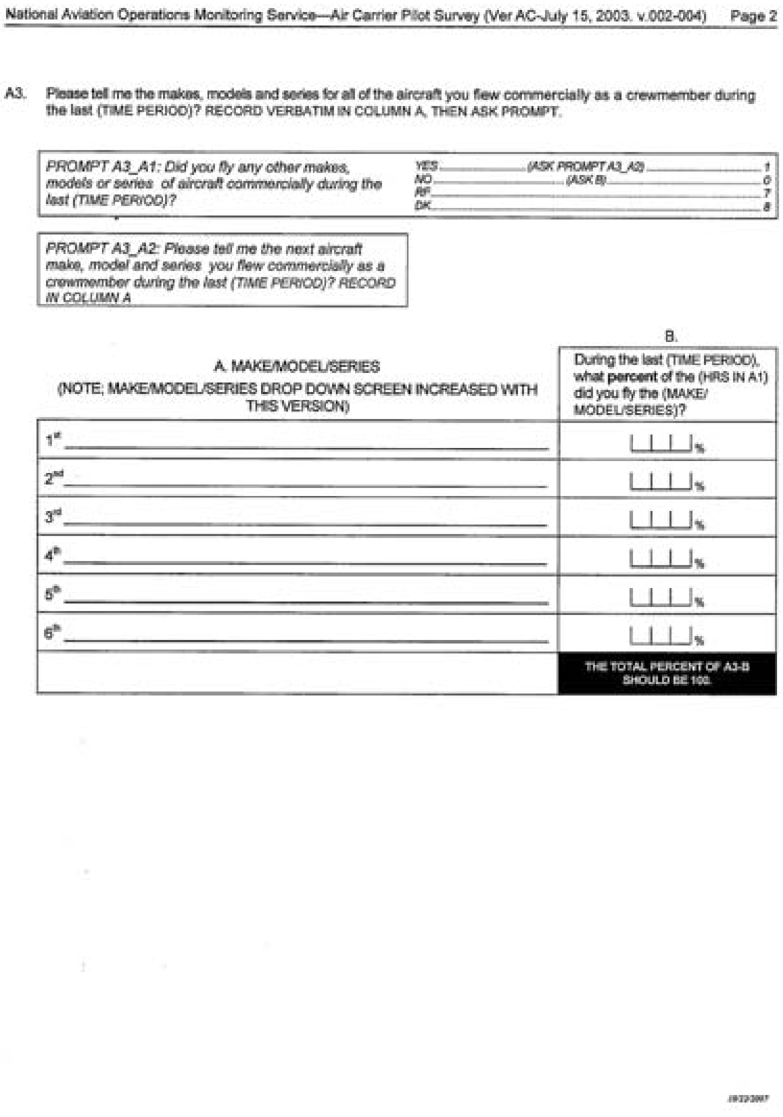
LEGS IN TIME PERIOD .... ⎿⏊⏊⏌

A2.1 During the last (TIME PERIOD), how many of the (#A2) legs you flew involved taking off or landing at an airport outside the United States?

NOTE: THE UNITED STATES MEANS THE 50 STATES AND WASHINGTON DC, BUT DOES NOT INCLUDE US TERRITORIES.

LEGS OUTSIDE U.S. .... ⎿⏊⏊⏌

NUMBER OF LEGS IN A2.1 MUST BE LESS THAN OR EQUAL TO LEGS IN A2.



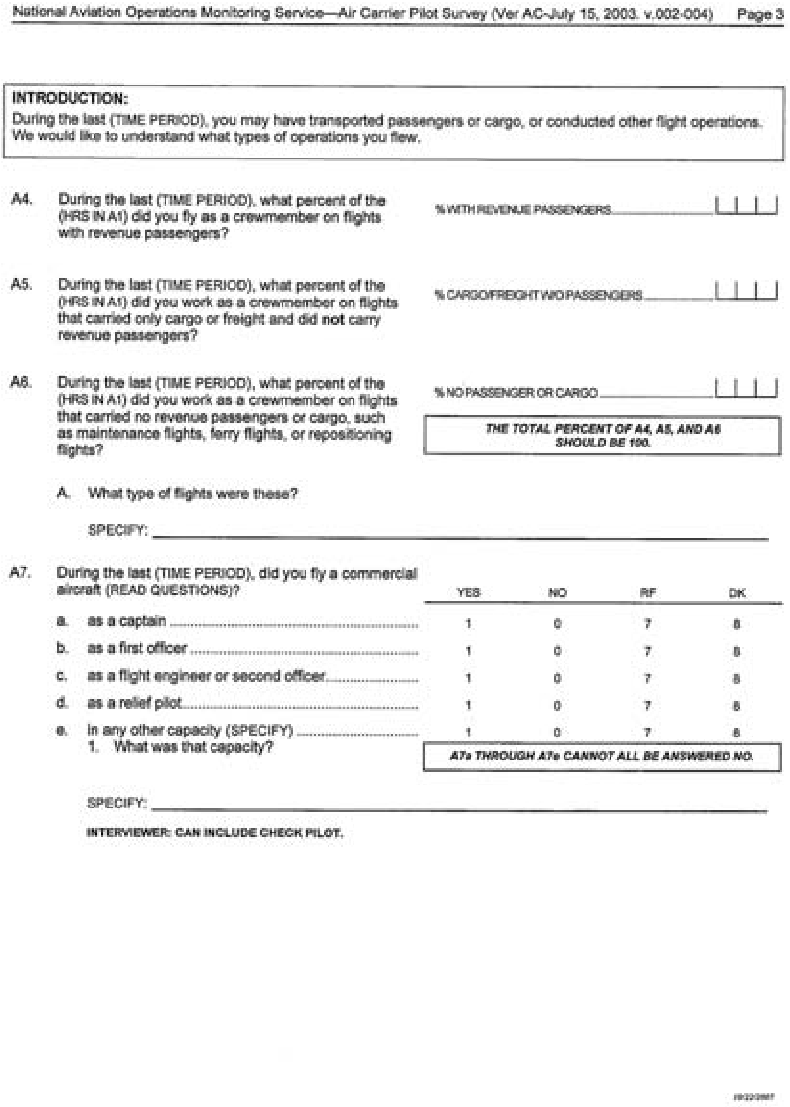
A3. Please tell me the makes, models and series for all of the aircraft you flew commercially as a crewmember during the last (TIME PERIOD)? RECORD VERBATIM IN COLUMN A, THEN ASK PROMPT.

PROMPT A3_A1: Did you fly any other makes, models or series of aircraft commercially during the last (TIME PERIOD)?

YES .... *(ASK PROMPT A3_A2)* *1*
NO .... *(ASK B)* *0*
RF *7*
DK *8*

PROMPT A3_A2: Please tell me the next aircraft make, model and series you flew commercially as a crewmember during the last (TIME PERIOD)? RECORD IN COLUMN A

A. MAKE/MODEL/SERIES (NOTE; MAKE/MODEL/SERIES DROP DOWN SCREEN INCREASED WITH THIS VERSION)	B. During the last (TIME PERIOD), what **percent** of the (HRS IN A1) did you fly the (MAKE/ MODEL/SERIES)?
1st ____________________	___ %
2nd ____________________	___ %
3rd ____________________	___ %
4th ____________________	___ %
5th ____________________	___ %
6th ____________________	___ %
	THE TOTAL PERCENT OF A3-B SHOULD BE 100.



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INTRODUCTION:
During the last (TIME PERIOD), you may have transported passengers or cargo, or conducted other flight operations. We would like to understand what types of operations you flew.

A4. During the last (TIME PERIOD), what percent of the (HRS IN A1) did you fly as a crewmember on flights with revenue passengers?

% WITH REVENUE PASSENGERS ______ |_|_|_|

A5. During the last (TIME PERIOD), what percent of the (HRS IN A1) did you work as a crewmember on flights that carried only cargo or freight and did **not** carry revenue passengers?

% CARGO/FREIGHT W/O PASSENGERS ______ |_|_|_|

A6. During the last (TIME PERIOD), what percent of the (HRS IN A1) did you work as a crewmember on flights that carried no revenue passengers or cargo, such as maintenance flights, ferry flights, or repositioning flights?

% NO PASSENGER OR CARGO ______ |_|_|_|

THE TOTAL PERCENT OF A4, A5, AND A6 SHOULD BE 100.

A. What type of flights were these?

SPECIFY: ______________________________

A7. During the last (TIME PERIOD), did you fly a commercial aircraft (READ QUESTIONS)?

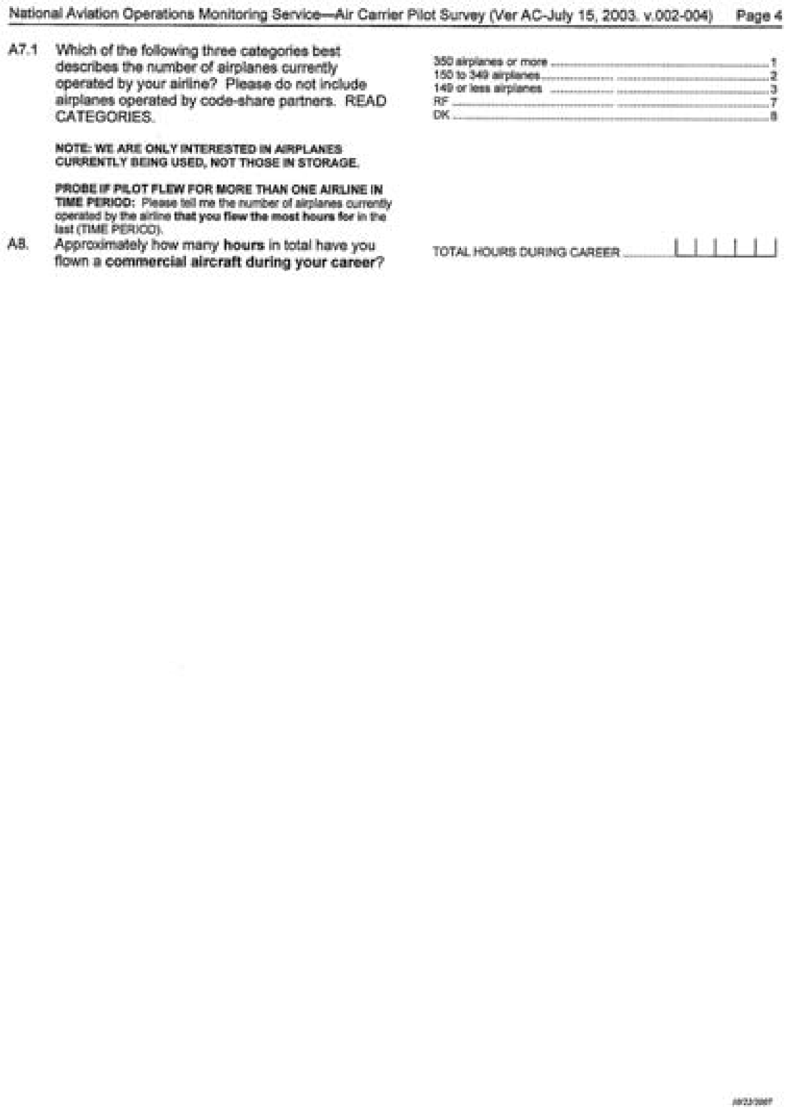
	YES	NO	RF	DK
a. as a captain	1	0	7	8
b. as a first officer	1	0	7	8
c. as a flight engineer or second officer	1	0	7	8
d. as a relief pilot	1	0	7	8
e. In any other capacity (SPECIFY)	1	0	7	8

1. What was that capacity?

A7a THROUGH A7e CANNOT ALL BE ANSWERED NO.

SPECIFY: ______________________________

INTERVIEWER: CAN INCLUDE CHECK PILOT.



A7.1 Which of the following three categories best describes the number of airplanes currently operated by your airline? Please do not include airplanes operated by code-share partners. READ CATEGORIES.

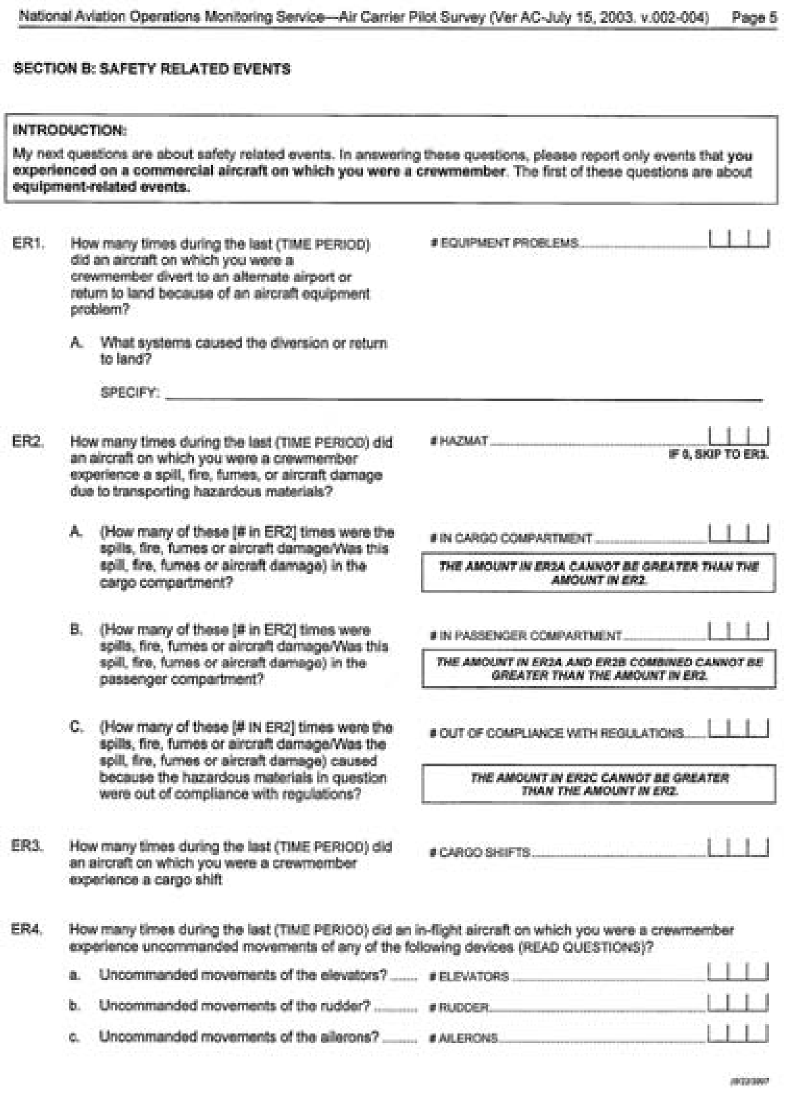
NOTE: WE ARE ONLY INTERESTED IN AIRPLANES CURRENTLY BEING USED, NOT THOSE IN STORAGE.

PROBE IF PILOT FLEW FOR MORE THAN ONE AIRLINE IN TIME PERIOD: Please tell me the number of airplanes currently operated by the airline **that you flew the most hours for** in the last (TIME PERIOD).

350 airplanes or more	1
150 to 349 airplanes	2
149 or less airplanes	3
RF	7
DK	8

A8. Approximately how many **hours** in total have you flown a **commercial aircraft during your career**?

TOTAL HOURS DURING CAREER .... |_|_|_|_|_|



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SECTION B: SAFETY RELATED EVENTS

INTRODUCTION:

My next questions are about safety related events. In answering these questions, please report only events that **you experienced on a commercial aircraft on which you were a crewmember**. The first of these questions are about **equipment-related events.**

ER1. How many times during the last (TIME PERIOD) did an aircraft on which you were a crewmember divert to an alternate airport or return to land because of an aircraft equipment problem? # EQUIPMENT PROBLEMS .... |_|_|_|

A. What systems caused the diversion or return to land?

SPECIFY: ____________________

ER2. How many times during the last (TIME PERIOD) did an aircraft on which you were a crewmember experience a spill, fire, fumes, or aircraft damage due to transporting hazardous materials? # HAZMAT .... |_|_|_|

IF 0, SKIP TO ER3.

A. (How many of these [# in ER2] times were the spills, fire, fumes or aircraft damage/Was this spill, fire, fumes or aircraft damage) in the cargo compartment? # IN CARGO COMPARTMENT .... |_|_|_|

THE AMOUNT IN ER2A CANNOT BE GREATER THAN THE AMOUNT IN ER2.

B. (How many of these [# in ER2] times were spills, fire, fumes or aircraft damage/Was this spill, fire, fumes or aircraft damage) in the passenger compartment? # IN PASSENGER COMPARTMENT .... |_|_|_|

THE AMOUNT IN ER2A AND ER2B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN ER2.

C. (How many of these [# IN ER2] times were the spills, fire, fumes or aircraft damage/Was the spill, fire, fumes or aircraft damage) caused because the hazardous materials in question were out of compliance with regulations? # OUT OF COMPLIANCE WITH REGULATIONS .... |_|_|_|

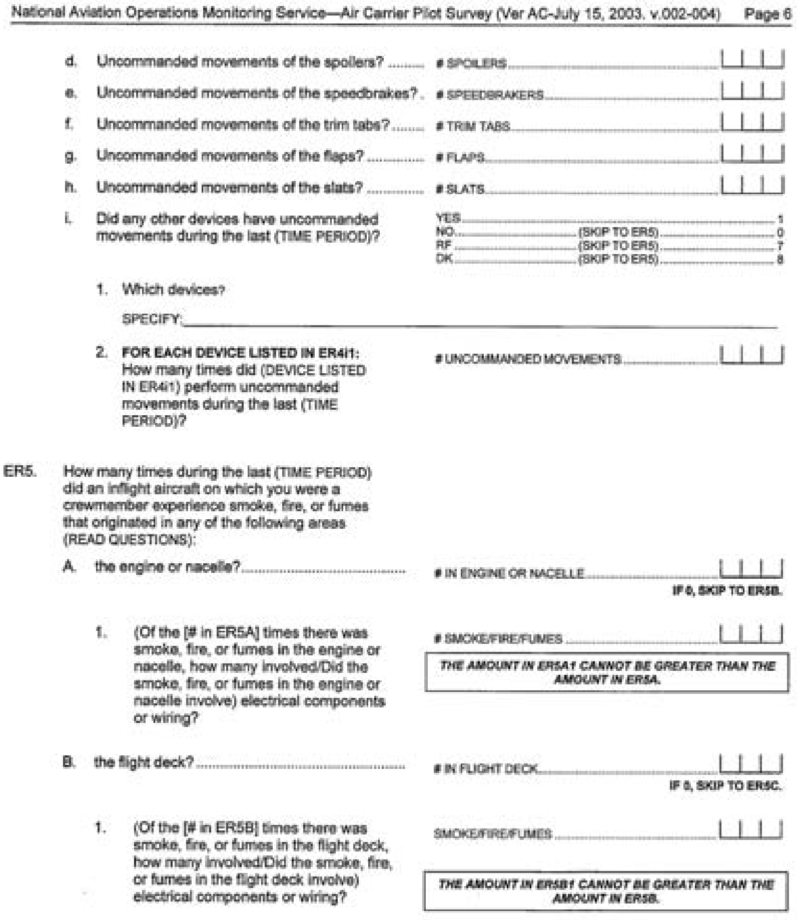
THE AMOUNT IN ER2C CANNOT BE GREATER THAN THE AMOUNT IN ER2.

ER3. How many times during the last (TIME PERIOD) did an aircraft on which you were a crewmember experience a cargo shift # CARGO SHIFTS .... |_|_|_|

ER4. How many times during the last (TIME PERIOD) did an in-flight aircraft on which you were a crewmember experience uncommanded movements of any of the following devices (READ QUESTIONS)?

a. Uncommanded movements of the elevators? .... # ELEVATORS .... |_|_|_|
b. Uncommanded movements of the rudder? .... # RUDDER .... |_|_|_|
c. Uncommanded movements of the ailerons? .... # AILERONS .... |_|_|_|

08/22/2007



d.	Uncommanded movements of the spoilers?	# SPOILERS ☐☐☐
e.	Uncommanded movements of the speedbrakes?	# SPEEDBRAKERS ☐☐☐
f.	Uncommanded movements of the trim tabs?	# TRIM TABS ☐☐☐
g.	Uncommanded movements of the flaps?	# FLAPS ☐☐☐
h.	Uncommanded movements of the slats?	# SLATS ☐☐☐
i.	Did any other devices have uncommanded movements during the last (TIME PERIOD)?	YES 1 NO (SKIP TO ER5) 0 RF (SKIP TO ER5) 7 DK (SKIP TO ER5) 8

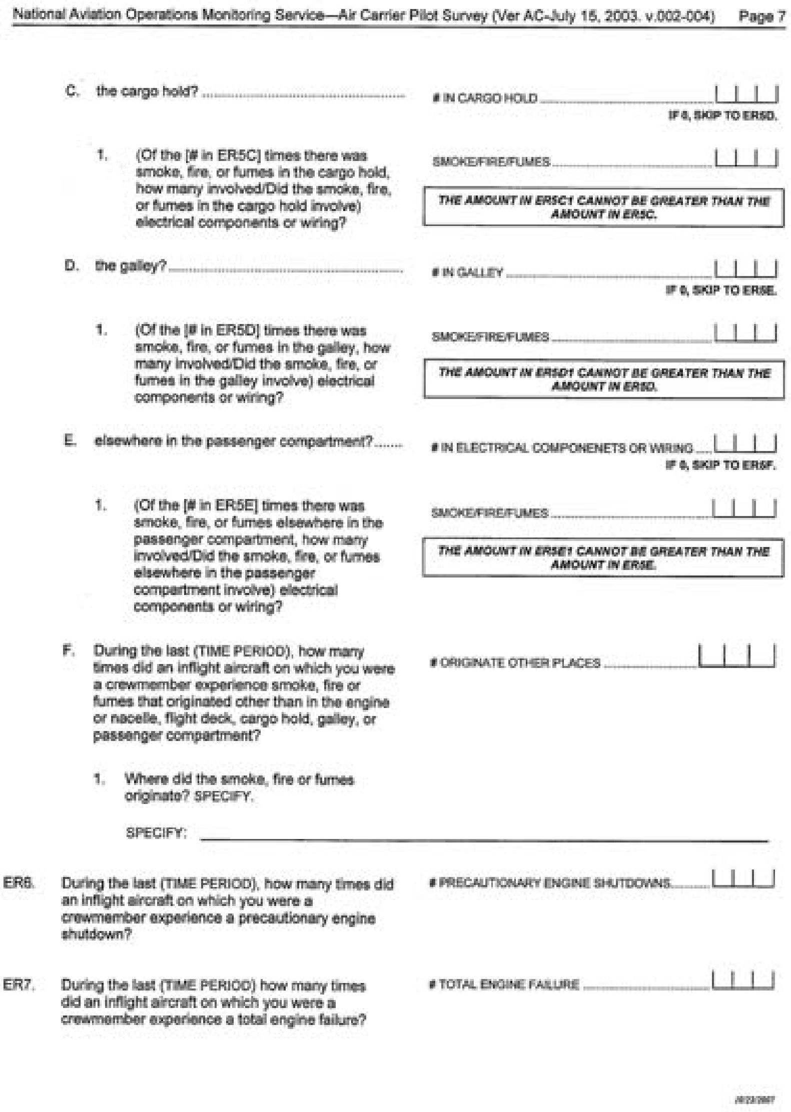
1. Which devices?

   SPECIFY: ____________________

2. **FOR EACH DEVICE LISTED IN ER4i1:** How many times did (DEVICE LISTED IN ER4i1) perform uncommanded movements during the last (TIME PERIOD)? — # UNCOMMANDED MOVEMENTS ☐☐☐

ER5. How many times during the last (TIME PERIOD) did an inflight aircraft on which you were a crewmember experience smoke, fire, or fumes that originated in any of the following areas (READ QUESTIONS):

A.	the engine or nacelle?	# IN ENGINE OR NACELLE ☐☐☐ **IF 0, SKIP TO ER5B.**
1.	(Of the [# in ER5A] times there was smoke, fire, or fumes in the engine or nacelle, how many involved/Did the smoke, fire, or fumes in the engine or nacelle involve) electrical components or wiring?	# SMOKE/FIRE/FUMES ☐☐☐ ***THE AMOUNT IN ER5A1 CANNOT BE GREATER THAN THE AMOUNT IN ER5A.***
B.	the flight deck?	# IN FLIGHT DECK ☐☐☐ **IF 0, SKIP TO ER5C.**
1.	(Of the [# in ER5B] times there was smoke, fire, or fumes in the flight deck, how many involved/Did the smoke, fire, or fumes in the flight deck involve) electrical components or wiring?	SMOKE/FIRE/FUMES ☐☐☐ ***THE AMOUNT IN ER5B1 CANNOT BE GREATER THAN THE AMOUNT IN ER5B.***



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C.	the cargo hold?	# IN CARGO HOLD ☐☐☐ IF 0, SKIP TO ER5D.
1.	(Of the [# in ER5C] times there was smoke, fire, or fumes in the cargo hold, how many involved/Did the smoke, fire, or fumes in the cargo hold involve) electrical components or wiring?	SMOKE/FIRE/FUMES ☐☐☐ *THE AMOUNT IN ER5C1 CANNOT BE GREATER THAN THE AMOUNT IN ER5C.*
D.	the galley?	# IN GALLEY ☐☐☐ IF 0, SKIP TO ER5E.
1.	(Of the [# in ER5D] times there was smoke, fire, or fumes in the galley, how many involved/Did the smoke, fire, or fumes in the galley involve) electrical components or wiring?	SMOKE/FIRE/FUMES ☐☐☐ *THE AMOUNT IN ER5D1 CANNOT BE GREATER THAN THE AMOUNT IN ER5D.*
E.	elsewhere in the passenger compartment?	# IN ELECTRICAL COMPONENETS OR WIRING ☐☐☐ IF 0, SKIP TO ER5F.
1.	(Of the [# in ER5E] times there was smoke, fire, or fumes elsewhere in the passenger compartment, how many involved/Did the smoke, fire, or fumes elsewhere in the passenger compartment involve) electrical components or wiring?	SMOKE/FIRE/FUMES ☐☐☐ *THE AMOUNT IN ER5E1 CANNOT BE GREATER THAN THE AMOUNT IN ER5E.*
F.	During the last (TIME PERIOD), how many times did an inflight aircraft on which you were a crewmember experience smoke, fire or fumes that originated other than in the engine or nacelle, flight deck, cargo hold, galley, or passenger compartment?	# ORIGINATE OTHER PLACES ☐☐☐
1.	Where did the smoke, fire or fumes originate? SPECIFY.	

SPECIFY: ______________________________

ER6.	During the last (TIME PERIOD), how many times did an inflight aircraft on which you were a crewmember experience a precautionary engine shutdown?	# PRECAUTIONARY ENGINE SHUTDOWNS ☐☐☐
ER7.	During the last (TIME PERIOD) how many times did an inflight aircraft on which you were a crewmember experience a total engine failure?	# TOTAL ENGINE FAILURE ☐☐☐

INTRODUCTION:
The following questions relate to **turbulence**.

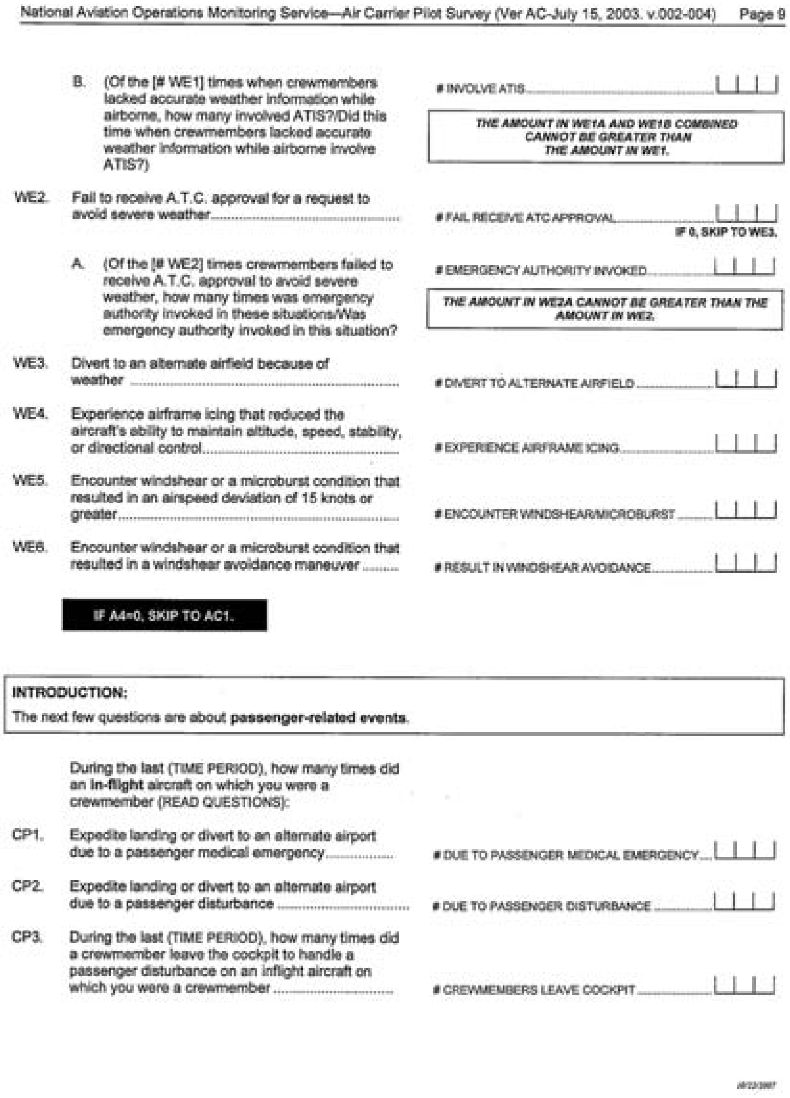
During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember (READ QUESTION)?

TU1.	Encounter severe turbulence that caused large abrupt changes in altitude, airspeed, or attitude........	# CAUSED ABRUPT CHANGES........ |__|__|__| IF 0, SKIP TO TU2.
	A. (Of the [#in TU1] severe turbulence encounters, how many occurred/Did this severe turbulence encounter occur) in I.M.C. conditions? I.M.C. = INSTRUMENT METEOROLOGICAL CONDITIONS	# IN IMC CONDITIONS........ |__|__|__| ***THE AMOUNT IN TU1A CANNOT BE GREATER THAN THE AMOUNT IN TU1.***
	B. (Of the [# in TU1] severe turbulence encounters, how many occurred/Did this severe turbulence encounter occur) in clear air?	# IN CLEAR AIR........ |__|__|__| ***THE AMOUNT IN TU1A AND TU1B CANNOT BE GREATER THAN THE AMOUNT IN TU1.***
TU2.	Encounter wake turbulence that resulted in 10 or more degrees of aircraft roll........	# RESULTING IN AIRCRAFT ROLL........ |__|__|__|

INTRODUCTION:
The next few questions are about **weather-related events while airborne**.

During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember (READ QUESTION)?

WE1.	Lack accurate weather information when crewmembers needed it while airborne........	# LACK WEATHER INFORMATION........ |__|__|__| IF 0, SKIP TO WE2.
	A. (Of the [# WE1] times when crewmembers lacked accurate weather information while airborne, how many involved non-U.S. airports or controllers?/ Did this time when crewmembers lacked accurate weather information while airborne involve a non-U.S. airport or controller?)	# INVOLVE NON-US AIRPORT OR CONTROLLER... |__|__|__| ***THE AMOUNT IN WE1A CANNOT BE GREATER THAN THE AMOUNT IN WE1.***



	B. (Of the [# WE1] times when crewmembers lacked accurate weather information while airborne, how many involved ATIS?/Did this time when crewmembers lacked accurate weather information while airborne involve ATIS?)	# INVOLVE ATIS .... └┴┴┘ ***THE AMOUNT IN WE1A AND WE1B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN WE1.***
WE2.	Fail to receive A.T.C. approval for a request to avoid severe weather	# FAIL RECEIVE ATC APPROVAL .... └┴┴┘ **IF 0, SKIP TO WE3.**
	A. (Of the [# WE2] times crewmembers failed to receive A.T.C. approval to avoid severe weather, how many times was emergency authority invoked in these situations/Was emergency authority invoked in this situation?	# EMERGENCY AUTHORITY INVOKED .... └┴┴┘ ***THE AMOUNT IN WE2A CANNOT BE GREATER THAN THE AMOUNT IN WE2.***
WE3.	Divert to an alternate airfield because of weather	# DIVERT TO ALTERNATE AIRFIELD .... └┴┴┘
WE4.	Experience airframe icing that reduced the aircraft's ability to maintain altitude, speed, stability, or directional control	# EXPERIENCE AIRFRAME ICING .... └┴┴┘
WE5.	Encounter windshear or a microburst condition that resulted in an airspeed deviation of 15 knots or greater	# ENCOUNTER WINDSHEAR/MICROBURST .... └┴┴┘
WE6.	Encounter windshear or a microburst condition that resulted in a windshear avoidance maneuver	# RESULT IN WINDSHEAR AVOIDANCE .... └┴┴┘

IF A4=0, SKIP TO AC1.

INTRODUCTION:

The next few questions are about **passenger-related events**.

During the last (TIME PERIOD), how many times did an **in-flight** aircraft on which you were a crewmember (READ QUESTIONS):

CP1.	Expedite landing or divert to an alternate airport due to a passenger medical emergency	# DUE TO PASSENGER MEDICAL EMERGENCY .... └┴┴┘
CP2.	Expedite landing or divert to an alternate airport due to a passenger disturbance	# DUE TO PASSENGER DISTURBANCE .... └┴┴┘
CP3.	During the last (TIME PERIOD), how many times did a crewmember leave the cockpit to handle a passenger disturbance on an inflight aircraft on which you were a crewmember	# CREWMEMBERS LEAVE COCKPIT .... └┴┴┘

INTRODUCTION:

The next few questions are about **airborne conflicts**.

	During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember (READ QUESTION)?	
AC1.	Experience a bird strike	# BIRD STRIKES ☐☐☐
AC2.	Perform an evasive action to avoid an imminent in-flight collision with another aircraft that was never closer than 500 feet including evasive action in response to a TCAS advisory?	# EVASIVE ACTIONS ☐☐☐
AC3.	Experience less than 500 feet of separation from another aircraft while both aircraft were airborne	# LESS THAN 500 FEET SEPARATION ☐☐☐

INTRODUCTION:

The next few questions are about **ground operations**.

	During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember (READ QUESTION)?	
GE1.	Go off the edge of a runway or taxiway while taxiing	# GO OFF EDGE RUNWAY/TAXIWAY ☐☐☐
GE2.	Collide or nearly collide with a ground vehicle?	# COLLIDE WITH GROUND VEHICLE ☐☐☐ **IF 0, SKIP TO GE3.**
	A. (Of the [# in GE2] near collisions with a ground vehicle, how many occurred/Did this near collision with a ground vehicle occur) while your aircraft was on the ramp, apron or in the gate area?	# ON RAMP/APRON/GATE AREA ☐☐☐ ***THE AMOUNT IN GE2A CANNOT BE GREATER THAN THE AMOUNT IN GE2.***
	B. (Of the [# in GE2] near collisions with a ground vehicle, how many occurred/Did this near collision with a ground vehicle occur) while your aircraft was on the taxiway?	# ON TAXIWAY ☐☐☐ ***THE AMOUNT IN GE2A AND GE2B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE2.***
	C. (Of the [# in GE2] near collisions with a ground vehicle, how many occurred/Did this near collision with a ground vehicle occur) while your aircraft was on the runway?	# ON RUNWAY ☐☐☐ ***THE AMOUNT IN GE2A, GE2B, AND GE2C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE2.***
GE3.	Skid, slide, or hydroplane resulting in a significant increase in stopping distance during landing	# SKID/SLIDE/HYDROPLANE ☐☐☐
GE4.	Experience a rejected takeoff	# REJECTED TAKEOFFS ☐☐☐

GE5.	Go off the edge of a runway while taking off or landing	# GO OFF EDGE OF RUNWAY ☐☐☐
GE6.	Go off the end of the runway	# GO OFF END OF RUNWAY ☐☐☐
GE7.	Inadvertently enter an active runway	# ENTER ACTIVE RUNWAY ☐☐☐
GE8.	Begin takeoff roll while another aircraft occupied or was crossing the same runway	# TAKEOFF ROLL WITH OCCUPIED RUNWAY ☐☐☐
GE9.	Land while another aircraft occupied or was crossing the same runway	# LAND ON OCCUPIED RUNWAY ☐☐☐
GE10.	Nearly experience a ground collision with another aircraft while both aircraft were on the ground	# NEAR GROUND COLLISION ☐☐☐ **IF 0, SKIP TO AH1.**
A.	(Of the [# in GE10] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the ramp, apron or in the gate area?	# ON RAMP/APRON/GATE AREA ☐☐☐ ***THE AMOUNT IN GE10A CANNOT BE GREATER THAN THE AMOUNT IN GE10.***
B.	(Of the [# in GE10] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the taxiway?	# ON TAXIWAY ☐☐☐ ***THE AMOUNT IN GE10A AND GE10B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE10.***
C.	(Of the [# in GE10] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the runway?	# ON RUNWAY ☐☐☐ ***THE AMOUNT IN GE10A, GE10B, AND GE10C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE10.***

INTRODUCTION:

The next few questions are about **aircraft handling-related events.**

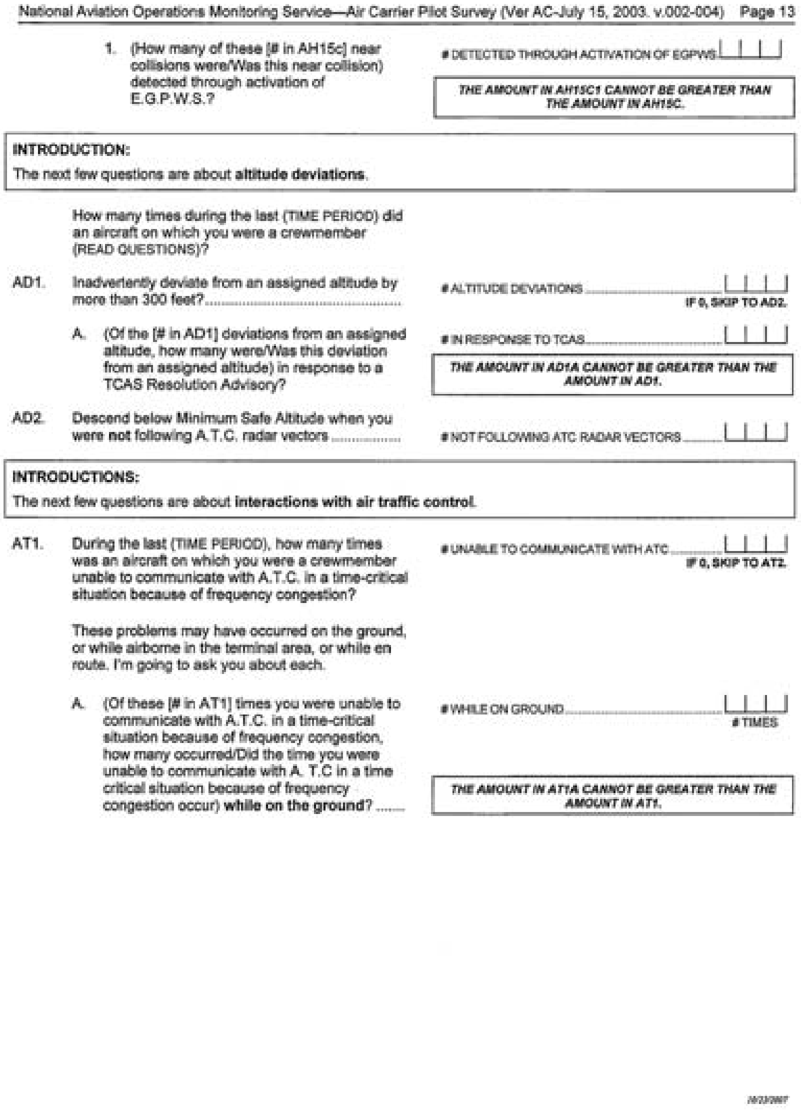
During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember (READ QUESTION)?

AH1.	Use some of its reserve fuel as defined by the F.A.Rs	# USE RESERVE FUEL ☐☐☐
AH2.	Accept an A.T.C. clearance that the aircraft could not comply with because of its performance limits	# ACCEPT CLEARANCE NOT COMPLY WITH ☐☐☐
AH3.	Lose sight of another aircraft from which the aircrew was trying to maintain visual separation	# LOSE SIGHT OF AIRCRAFT ☐☐☐ **IF 0, SKIP TO AH4.**
A.	(Of the [# in AH3] times an aircraft lost sight of another aircraft, how many occurred/Did losing sight of another aircraft occur) in marginal visual conditions of 3 miles or less?	# IN MARGINAL VISUAL CONDITONS ☐☐☐ ***THE AMOUNT IN AH3A CANNOT BE GREATER THAN THE AMOUNT IN AH3.***

AH4.	Inadvertently land without clearance at an airport with an active control tower	# LAND W/O CLEARANCE ☐☐☐
AH5.	Inadvertently begin takeoff roll without A.T.C. clearance at an airport with an active control tower	# TAKEOFF ROLL W/O CLEARANCE ☐☐☐
AH6	Inadvertently deviate from an assigned routing or A.T.C. vector for one minute or more	# DEVIATIONS ☐☐☐
AH7.	Experience a tail strike on landing	# TAIL STRIKES ON LANDING ☐☐☐
AH8.	Experience a tail strike on takeoff	# TAIL STRIKES ON TAKEOFF ☐☐☐
AH9.	Experience a hard landing	# HARD LANDINGS ☐☐☐
AH10.	Take off with an out-of-limit center of gravity	# TAKE-OFF OUT-OF-LIMIT CENTER OF GRAVITY ☐☐☐
AH11.	Take-off overweight	# TAKE-OFF OVERWEIGHT ☐☐☐
AH12.	Commence take-off roll with an improper aircraft configuration	# WITH IMPROPER CONFIGURATION ☐☐☐
AH13.	Experience an unusual attitude for any reason	# UNUSUAL ATTITUDE ☐☐☐
AH14.	Experience a valid stall warning or stick shaker activation	# STALL WARNING/STICK SHAKER ACTIVATION ☐☐☐
AH15.	Nearly collide with terrain or a ground obstruction while airborne?	# NEAR COLLISIONS/GROUND ☐☐☐ **IF 0, SKIP TO AD1.**

INTERVIEWER: INCLUDES BUILDINGS

A.	(Of the [# in AH15] near collisions with terrain or a ground obstruction, how many were/Was this near collision with terrain or a ground obstruction)-brought to your attention by A.T.C.?	# ATC BROUGHT TO YOUR ATTENTION ☐☐ ***THE AMOUNT IN AH15A CANNOT BE GREATER THAN THE AMOUNT IN AH15.***
B.	(Of the [# in AH15] near collisions with terrain or a ground obstruction, how many were/Was this near collision with terrain or a ground obstruction) detected through direct sighting of the ground or obstruction?	# DETECTED THROUGH DIRECT SIGHTING ☐☐ ***THE AMOUNT IN AH15A AND AH15B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN AH15.***
C.	(Of the [# in AH15] near collisions with terrain or a ground obstruction, how many were/Was this near collision with terrain or a ground obstruction)-detected through activation of G.P.W.S. or E.G.P.W.S.?	# DETECTED THROUGH GPWS/EGPWS ☐☐ ***THE AMOUNT IN AH15A, AH15B, AND AH15C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE10.***



1. (How many of these [# in AH15c] near collisions were/Was this near collision) detected through activation of E.G.P.W.S.?

DETECTED THROUGH ACTIVATION OF EGPWS |_|_|_|

THE AMOUNT IN AH15C1 CANNOT BE GREATER THAN THE AMOUNT IN AH15C.

INTRODUCTION:

The next few questions are about **altitude deviations**.

How many times during the last (TIME PERIOD) did an aircraft on which you were a crewmember (READ QUESTIONS)?

AD1. Inadvertently deviate from an assigned altitude by more than 300 feet? ....

ALTITUDE DEVIATIONS .... |_|_|_|

IF 0, SKIP TO AD2.

A. (Of the [# in AD1] deviations from an assigned altitude, how many were/Was this deviation from an assigned altitude) in response to a TCAS Resolution Advisory?

IN RESPONSE TO TCAS .... |_|_|_|

THE AMOUNT IN AD1A CANNOT BE GREATER THAN THE AMOUNT IN AD1.

AD2. Descend below Minimum Safe Altitude when you were **not** following A.T.C. radar vectors ....

NOT FOLLOWING ATC RADAR VECTORS .... |_|_|_|

INTRODUCTIONS:

The next few questions are about **interactions with air traffic control**.

AT1. During the last (TIME PERIOD), how many times was an aircraft on which you were a crewmember unable to communicate with A.T.C. in a time-critical situation because of frequency congestion?

UNABLE TO COMMUNICATE WITH ATC .... |_|_|_|

IF 0, SKIP TO AT2.

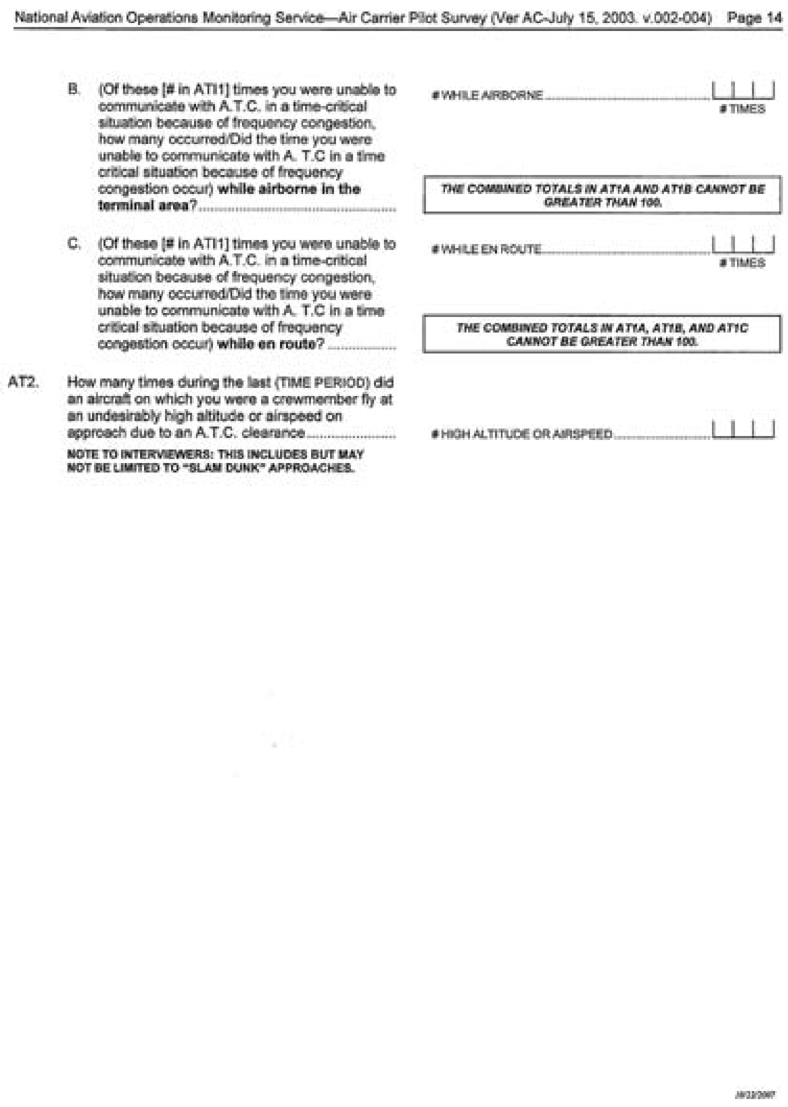
These problems may have occurred on the ground, or while airborne in the terminal area, or while en route. I'm going to ask you about each.

A. (Of these [# in AT1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A. T.C in a time critical situation because of frequency congestion occur) **while on the ground**? ....

WHILE ON GROUND .... |_|_|_|

TIMES

THE AMOUNT IN AT1A CANNOT BE GREATER THAN THE AMOUNT IN AT1.



B. (Of these [# in ATI1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A. T.C in a time critical situation because of frequency congestion occur) **while airborne in the terminal area?**..........

WHILE AIRBORNE .... |_|_|_|
TIMES

THE COMBINED TOTALS IN AT1A AND AT1B CANNOT BE GREATER THAN 100.

C. (Of these [# in ATI1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A. T.C in a time critical situation because of frequency congestion occur) **while en route?** ....

WHILE EN ROUTE.......... |_|_|_|
TIMES

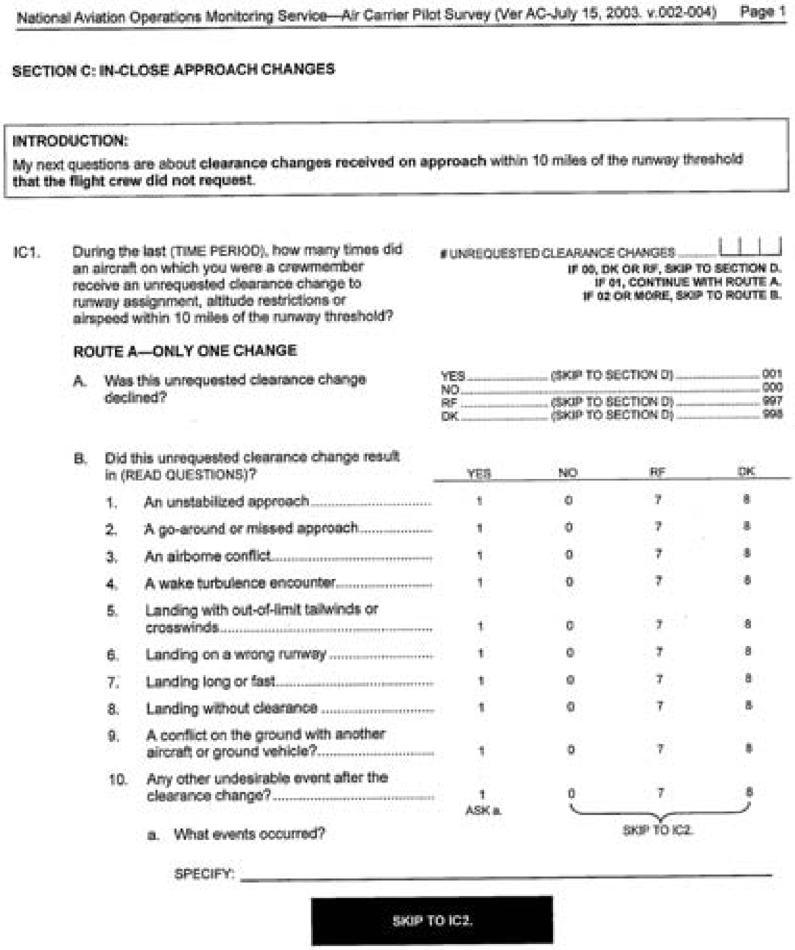
THE COMBINED TOTALS IN AT1A, AT1B, AND AT1C CANNOT BE GREATER THAN 100.

AT2. How many times during the last (TIME PERIOD) did an aircraft on which you were a crewmember fly at an undesirably high altitude or airspeed on approach due to an A.T.C. clearance..........

NOTE TO INTERVIEWERS: THIS INCLUDES BUT MAY NOT BE LIMITED TO "SLAM DUNK" APPROACHES.

HIGH ALTITUDE OR AIRSPEED.......... |_|_|_|

10/22/2007



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SECTION C: IN-CLOSE APPROACH CHANGES

INTRODUCTION:

My next questions are about **clearance changes received on approach** within 10 miles of the runway threshold **that the flight crew did not request.**

IC1. During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember receive an unrequested clearance change to runway assignment, altitude restrictions or airspeed within 10 miles of the runway threshold?

UNREQUESTED CLEARANCE CHANGES .... |__|__|__|

IF 00, DK OR RF, SKIP TO SECTION D.
IF 01, CONTINUE WITH ROUTE A.
IF 02 OR MORE, SKIP TO ROUTE B.

ROUTE A—ONLY ONE CHANGE

A. Was this unrequested clearance change declined?

YES .... (SKIP TO SECTION D) 001
NO 000
RF .... (SKIP TO SECTION D) 997
DK .... (SKIP TO SECTION D) 998

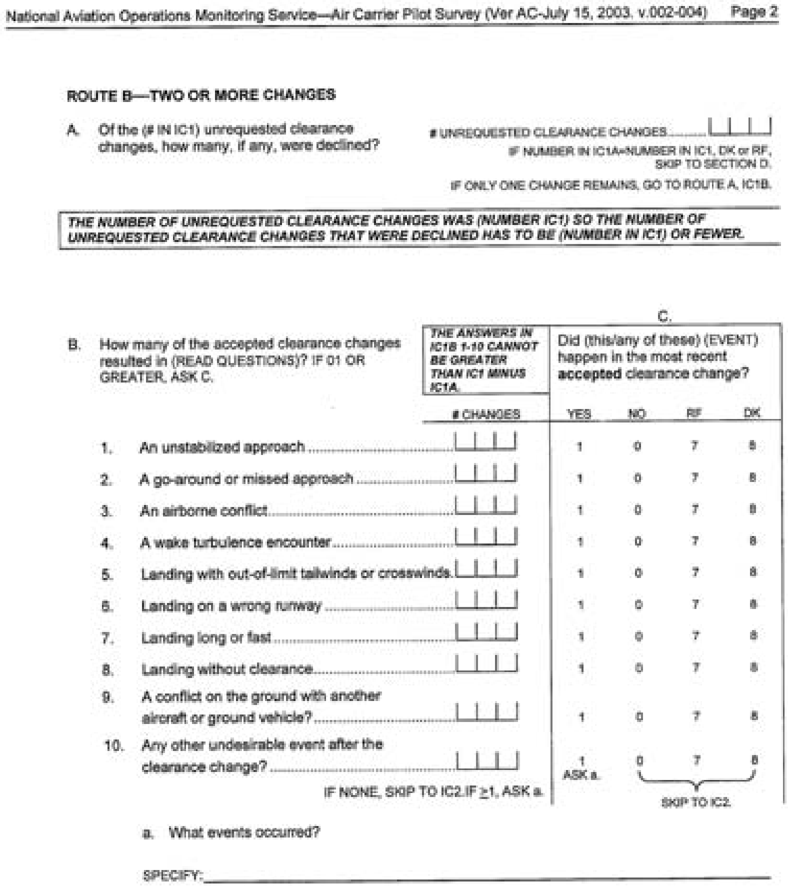
B. Did this unrequested clearance change result in (READ QUESTIONS)?

	YES	NO	RF	DK
1. An unstabilized approach	1	0	7	8
2. A go-around or missed approach	1	0	7	8
3. An airborne conflict	1	0	7	8
4. A wake turbulence encounter	1	0	7	8
5. Landing with out-of-limit tailwinds or crosswinds	1	0	7	8
6. Landing on a wrong runway	1	0	7	8
7. Landing long or fast	1	0	7	8
8. Landing without clearance	1	0	7	8
9. A conflict on the ground with another aircraft or ground vehicle?	1	0	7	8
10. Any other undesirable event after the clearance change?	1 ASK a.	0	7 SKIP TO IC2.	8

a. What events occurred?

SPECIFY: ______________________________

SKIP TO IC2.



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ROUTE B—TWO OR MORE CHANGES

A. Of the (# IN IC1) unrequested clearance changes, how many, if any, were declined?

# UNREQUESTED CLEARANCE CHANGES..........

IF NUMBER IN IC1A=NUMBER IN IC1, DK or RF, SKIP TO SECTION D.

IF ONLY ONE CHANGE REMAINS, GO TO ROUTE A, IC1B.

THE NUMBER OF UNREQUESTED CLEARANCE CHANGES WAS (NUMBER IC1) SO THE NUMBER OF UNREQUESTED CLEARANCE CHANGES THAT WERE DECLINED HAS TO BE (NUMBER IN IC1) OR FEWER.

B. How many of the accepted clearance changes resulted in (READ QUESTIONS)? IF 01 OR GREATER, ASK C.

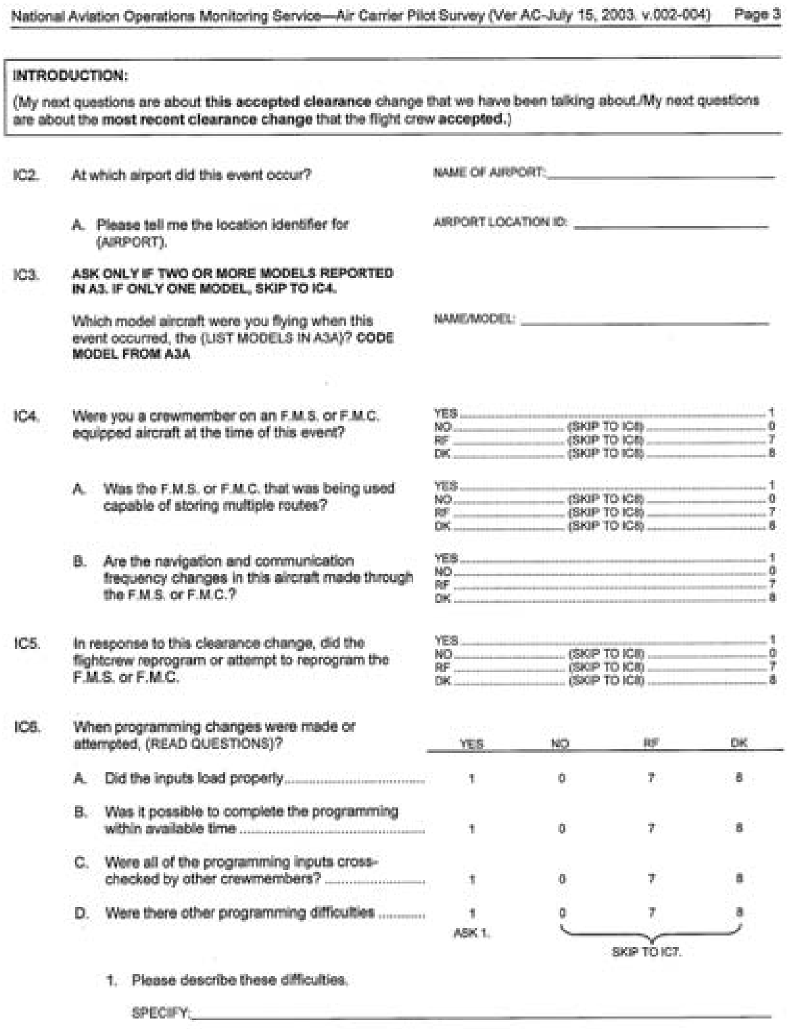
THE ANSWERS IN IC1B 1-10 CANNOT BE GREATER THAN IC1 MINUS IC1A.

C. Did (this/any of these) (EVENT) happen in the most recent **accepted** clearance change?

	# CHANGES	YES	NO	RF	DK
1. An unstabilized approach		1	0	7	8
2. A go-around or missed approach		1	0	7	8
3. An airborne conflict		1	0	7	8
4. A wake turbulence encounter		1	0	7	8
5. Landing with out-of-limit tailwinds or crosswinds		1	0	7	8
6. Landing on a wrong runway		1	0	7	8
7. Landing long or fast		1	0	7	8
8. Landing without clearance		1	0	7	8
9. A conflict on the ground with another aircraft or ground vehicle?		1	0	7	8
10. Any other undesirable event after the clearance change?		1 ASK a.	0	7	8
	IF NONE, SKIP TO IC2. IF ≥1, ASK a.		SKIP TO IC2.		

a. What events occurred?

SPECIFY: ______________________________



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INTRODUCTION:

(My next questions are about **this accepted clearance** change that we have been talking about./My next questions are about the **most recent clearance change** that the flight crew **accepted.**)

IC2. At which airport did this event occur? NAME OF AIRPORT: __________

A. Please tell me the location identifier for (AIRPORT). AIRPORT LOCATION ID: __________

IC3. **ASK ONLY IF TWO OR MORE MODELS REPORTED IN A3. IF ONLY ONE MODEL, SKIP TO IC4.**

Which model aircraft were you flying when this event occurred, the (LIST MODELS IN A3A)? **CODE MODEL FROM A3A** NAME/MODEL: __________

IC4. Were you a crewmember on an F.M.S. or F.M.C. equipped aircraft at the time of this event?

YES 1
NO .... (SKIP TO IC8) 0
RF .... (SKIP TO IC8) 7
DK .... (SKIP TO IC8) 8

A. Was the F.M.S. or F.M.C. that was being used capable of storing multiple routes?

YES 1
NO .... (SKIP TO IC8) 0
RF .... (SKIP TO IC8) 7
DK .... (SKIP TO IC8) 8

B. Are the navigation and communication frequency changes in this aircraft made through the F.M.S. or F.M.C.?

YES 1
NO 0
RF 7
DK 8

IC5. In response to this clearance change, did the flightcrew reprogram or attempt to reprogram the F.M.S. or F.M.C.

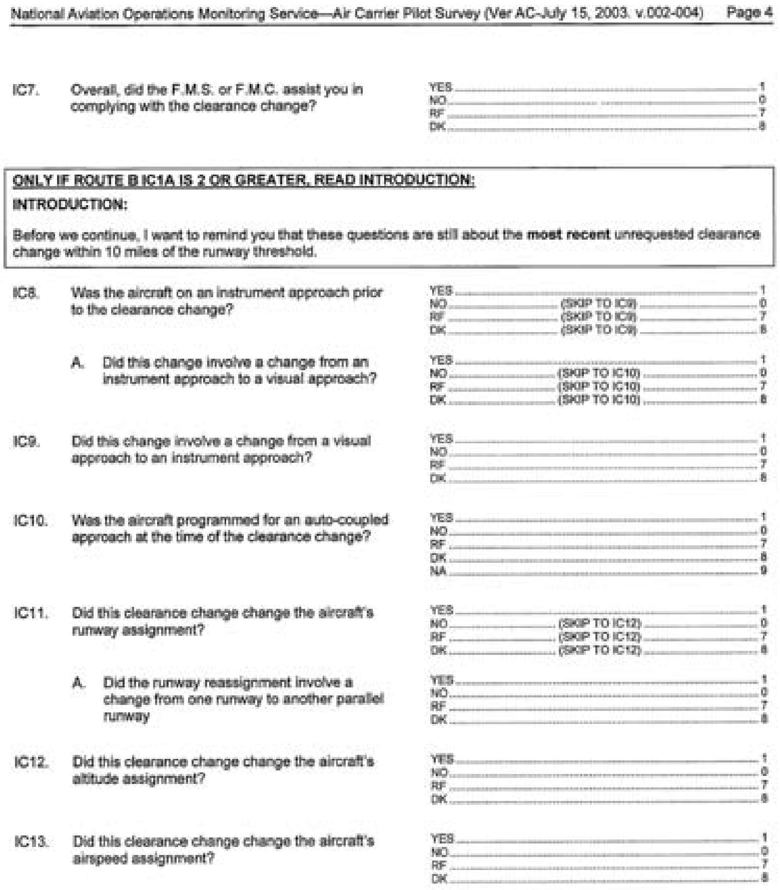
YES 1
NO .... (SKIP TO IC8) 0
RF .... (SKIP TO IC8) 7
DK .... (SKIP TO IC8) 8

IC6. When programming changes were made or attempted, (READ QUESTIONS)?

	YES	NO	RF	DK
A. Did the inputs load properly	1	0	7	8
B. Was it possible to complete the programming within available time	1	0	7	8
C. Were all of the programming inputs cross-checked by other crewmembers?	1	0	7	8
D. Were there other programming difficulties	1 ASK 1.	0	7	8
		SKIP TO IC7.		

1. Please describe these difficulties.

SPECIFY: __________



IC7.	Overall, did the F.M.S. or F.M.C. assist you in complying with the clearance change?	YES .... 1 NO .... 0 RF .... 7 DK 8

ONLY IF ROUTE B IC1A IS 2 OR GREATER, READ INTRODUCTION:

INTRODUCTION:

Before we continue, I want to remind you that these questions are still about the **most recent** unrequested clearance change within 10 miles of the runway threshold.

IC8.	Was the aircraft on an instrument approach prior to the clearance change?	YES .... 1 NO .... (SKIP TO IC9) .... 0 RF .... (SKIP TO IC9) .... 7 DK .... (SKIP TO IC9) 8
	A. Did this change involve a change from an instrument approach to a visual approach?	YES .... 1 NO .... (SKIP TO IC10) .... 0 RF .... (SKIP TO IC10) .... 7 DK .... (SKIP TO IC10) 8
IC9.	Did this change involve a change from a visual approach to an instrument approach?	YES .... 1 NO .... 0 RF .... 7 DK 8
IC10.	Was the aircraft programmed for an auto-coupled approach at the time of the clearance change?	YES .... 1 NO .... 0 RF .... 7 DK .... 8 NA 9
IC11.	Did this clearance change change the aircraft's runway assignment?	YES .... 1 NO .... (SKIP TO IC12) .... 0 RF .... (SKIP TO IC12) .... 7 DK .... (SKIP TO IC12) 8
	A. Did the runway reassignment involve a change from one runway to another parallel runway	YES .... 1 NO .... 0 RF .... 7 DK 8
IC12.	Did this clearance change change the aircraft's altitude assignment?	YES .... 1 NO .... 0 RF .... 7 DK 8
IC13.	Did this clearance change change the aircraft's airspeed assignment?	YES .... 1 NO .... 0 RF .... 7 DK 8

ONLY IF ROUTE B IC1A IS 2 OR GREATER, READ INTRODUCTION:

INTRODUCTION:

Once again, before we continue, I want to remind you that these questions are still about the **most recent** unrequested clearance change within 10 miles of the runway threshold.

IC14. In response to this clearance change, did the flightcrew (READ QUESTIONS)?

	YES	NO	RF	DK
A. Change a navigational aid frequency	1 (ASK 1)	0 (SKIP TO B)	7 (SKIP TO B)	8 (SKIP TO B)
1. Confirm the identity of the new navaid	1	0	7	8
B. Change the A.T.C. communication frequency	1	0	7	8
C. Revise the approach briefing	1	0	7	8
D. Change the airplane configuration	1	0	7	8
E. Disconnect any of the automated control systems?	1	0	7	8

IC15. Was the flight crew given a reason for the clearance change?

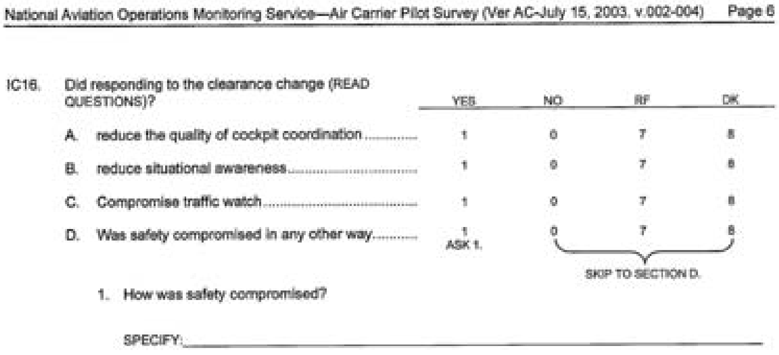
YES		1
NO	(SKIP TO IC16)	0
RF	(SKIP TO IC16)	7
DK	(SKIP TO IC16)	8

A. Was one of the reasons given (READ QUESTIONS)?

	YES	NO	RF	DK
1. Wake turbulence avoidance	1	0	7	8
2. Maintaining traffic flow and separation	1	0	7	8
3. Providing a runway favorable to your gates	1	0	7	8
4. A change in active runways	1	0	7	8
5. Weather or wind factors	1	0	7	8
6. Noise abatement factors	1	0	7	8
7. A.T.C. equipment problems	1	0	7	8
8. Was any other reason given for the clearance change	1 ASK a	0	7	8
		SKIP TO IC16		

a. What reasons were given?

SPECIFY: ______________________________



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IC16. Did responding to the clearance change (READ QUESTIONS)?

	YES	NO	RF	DK
A. reduce the quality of cockpit coordination	1	0	7	8
B. reduce situational awareness	1	0	7	8
C. Compromise traffic watch	1	0	7	8
D. Was safety compromised in any other way	1 ASK 1.	0	7 SKIP TO SECTION D.	8

1. How was safety compromised?

SPECIFY:____

SECTION C: JIMDAT QUESTIONS

In the next section, I will be asking you some questions about your flying experience and training as it relates to terminal operations and instrument approaches. As we go forward, please limit you answers to those things that you personally experienced.

JD1. Is the aircraft you flew (most) during the last 60 days equipped with G.P.W.S?

GPWS = ground proximity warning system

NO	(SKIP TO JD2)	0
YES		1
RF	(SKIP TO JD2)	7
DK	(SKIP TO JD2)	8

A. Is it equipped with a terrain display, such as you find in an enhanced G.P.W.S, or Terrain Avoidance Warning System, also known as TAWS (taws)?

NO	(SKIP TO JD2)	0
YES		1
RF	(SKIP TO JD2)	7
DK	(SKIP TO JD2)	8

B. Does your airline require the terrain display to be selected during takeoff at specific airports?

NO OR NEVER	(SKIP TO JD2)	0
YES OR SOMETIMES		1
RF	(SKIP TO JD2)	7
DK	(SKIP TO JD2)	8

C. Does your airline require the terrain display to be selected during descent and landing?

NO OR NEVER	0
YES OR SOMETIMES	1
RF	7
DK	8

D. For times that terrain display is not required, do you usually use it during takeoff?

NO, NOT USUALLY	0
YES, USUALLY	1
RF	7
DK	8

E. For times that terrain display is not required, do you usually use it during descent and landing?

NO, NOT USUALLY	0
YES, USUALLY	1
RF	7
DK	8

F. Has the terrain display experienced a map shift on any aircraft on which you were a crew member?

NO OR NEVER	0
YES OR SOMETIMES	1
RF	7
DK	8

JD2. During the last 60 days, how many times did an aircraft on which you were a crewmember experience a ground proximity warning?

TIMES ____ |__|__|__|

IF ZERO, SKIP TO JD3.

A. Was (this warning/ the most recent of these warnings) valid?

NO	(SKIP TO JD3)	0
YES		1
RF	(SKIP TO JD3)	7
DK	(SKIP TO JD3)	8

B. During this (most recent) warning, did you see the approaching terrain on the terrain display before you heard the aural warning?

NO	(SKIP TO JD3)	0
YES		1
RF	(SKIP TO JD3)	7
DK	(SKIP TO JD3)	8

JD3. During the last 60 days, how many times did an aircraft on which you were a crewmember receive a Minimum Safe Altitude Warning Alert, also known as an MSAW (em-saw) or an altitude awareness call from an A.T.C controller?

TIMES ______ |_|_|_|

IF ZERO, SKIP TO JD4.

A. (During the most recent of these events,) What did your aircraft do in response to the warning?

____

____

____

B. (During this most recent A.T.C. warning event,) Did the aircraft have an enhanced G.P.W.S. or T.A.W.S. (taws) installed?

NO	(SKIP TO JD4)	0
YES		1
RF	(SKIP TO JD4)	7
DK	(SKIP TO JD4)	8

GPWS = GROUND PROXIMITY WARNING SYSTEM
TAWS = TERRAIN AVOIDANCE WARNING SYSTEM

1. Did your aircraft also receive a ground proximity warning from this system?

NO	0
YES	1
RF	7
DK	8

JD4. How many times in the last 60 days, did an aircraft on which you were a crewmember fly a non-precision approach?

TIMES ______ |_|_|_|

IF ZERO, SKIP TO JD6.

A. (Was this non-precision approach flown in I.M.C? / How many of these non-precision approaches were flown in I.M.C?)

TIMES ______ |_|_|_|

IMC = INSTRUMENT METEOROLOGICAL CONDITIONS

JD5. How many times in the last 60 days did an aircraft on which you were a crewmember fly an un-stabilized non-precision approach where the aircraft was not in landing configuration, on airspeed, or on glide-slope by 1,000 feet I.M.C or 500 feet V.M.C?

TIMES ______ |_|_|_|

IF ZERO, SKIP TO JD6.

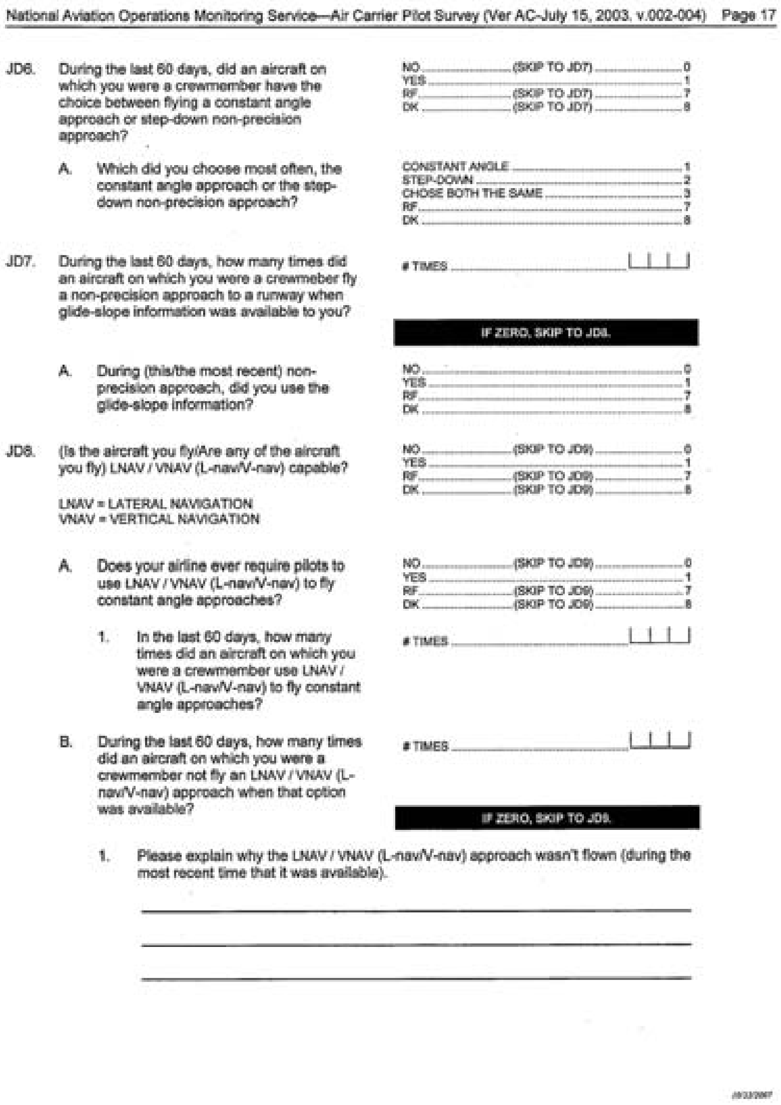
IMC = METEOROLOGICAL CONDITIONS
VMC = VISUAL METEOROLOGICAL CONDITIONS

A. (During the most recent un-stabilized non precision approach,) What factors contributed to the inability to conduct a stabilized approach?

____

____

____



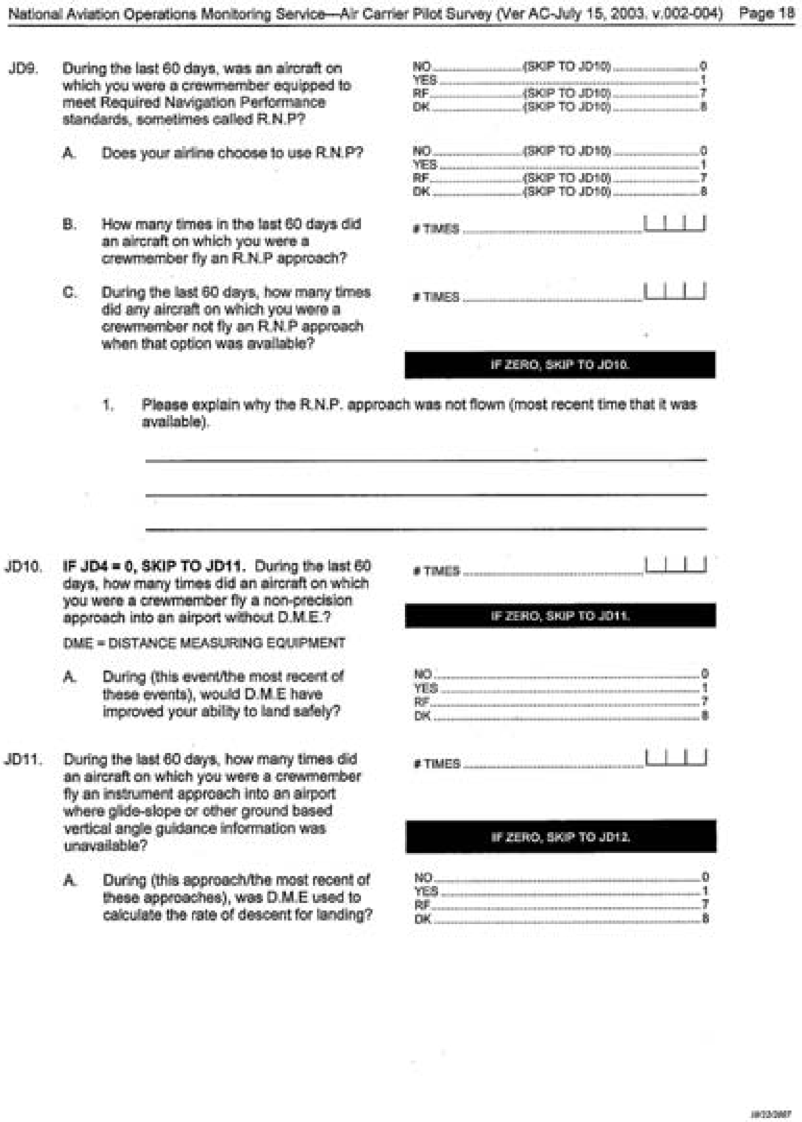
JD6.	During the last 60 days, did an aircraft on which you were a crewmember have the choice between flying a constant angle approach or step-down non-precision approach?	NO .... (SKIP TO JD7) .... 0 YES .... 1 RF .... (SKIP TO JD7) .... 7 DK .... (SKIP TO JD7) 8
A.	Which did you choose most often, the constant angle approach or the step-down non-precision approach?	CONSTANT ANGLE .... 1 STEP-DOWN .... 2 CHOSE BOTH THE SAME .... 3 RF .... 7 DK 8
JD7.	During the last 60 days, how many times did an aircraft on which you were a crewmeber fly a non-precision approach to a runway when glide-slope information was available to you?	# TIMES .... |_|_|_| **IF ZERO, SKIP TO JD8.**
A.	During (this/the most recent) non-precision approach, did you use the glide-slope information?	NO .... 0 YES .... 1 RF .... 7 DK 8
JD8.	(Is the aircraft you fly/Are any of the aircraft you fly) LNAV / VNAV (L-nav/V-nav) capable? LNAV = LATERAL NAVIGATION VNAV = VERTICAL NAVIGATION	NO .... (SKIP TO JD9) .... 0 YES .... 1 RF .... (SKIP TO JD9) .... 7 DK .... (SKIP TO JD9) 8
A.	Does your airline ever require pilots to use LNAV / VNAV (L-nav/V-nav) to fly constant angle approaches?	NO .... (SKIP TO JD9) .... 0 YES .... 1 RF .... (SKIP TO JD9) .... 7 DK .... (SKIP TO JD9) 8
1.	In the last 60 days, how many times did an aircraft on which you were a crewmember use LNAV / VNAV (L-nav/V-nav) to fly constant angle approaches?	# TIMES .... |_|_|_|
B.	During the last 60 days, how many times did an aircraft on which you were a crewmember not fly an LNAV / VNAV (L-nav/V-nav) approach when that option was available?	# TIMES .... |_|_|_| **IF ZERO, SKIP TO JD9.**

1. Please explain why the LNAV / VNAV (L-nav/V-nav) approach wasn't flown (during the most recent time that it was available).

____

____

____



JD9.	During the last 60 days, was an aircraft on which you were a crewmember equipped to meet Required Navigation Performance standards, sometimes called R.N.P?	NO .... (SKIP TO JD10) .... 0 YES .... 1 RF .... (SKIP TO JD10) .... 7 DK .... (SKIP TO JD10) 8
A.	Does your airline choose to use R.N.P?	NO .... (SKIP TO JD10) .... 0 YES .... 1 RF .... (SKIP TO JD10) .... 7 DK .... (SKIP TO JD10) 8
B.	How many times in the last 60 days did an aircraft on which you were a crewmember fly an R.N.P approach?	# TIMES .... └─┴─┴─┘
C.	During the last 60 days, how many times did any aircraft on which you were a crewmember not fly an R.N.P approach when that option was available?	# TIMES .... └─┴─┴─┘ **IF ZERO, SKIP TO JD10.**

1. Please explain why the R.N.P. approach was not flown (most recent time that it was available).

____

____

____

JD10.	**IF JD4 = 0, SKIP TO JD11.** During the last 60 days, how many times did an aircraft on which you were a crewmember fly a non-precision approach into an airport without D.M.E.? DME = DISTANCE MEASURING EQUIPMENT	# TIMES .... └─┴─┴─┘ **IF ZERO, SKIP TO JD11.**
A.	During (this event/the most recent of these events), would D.M.E have improved your ability to land safely?	NO .... 0 YES .... 1 RF .... 7 DK 8
JD11.	During the last 60 days, how many times did an aircraft on which you were a crewmember fly an instrument approach into an airport where glide-slope or other ground based vertical angle guidance information was unavailable?	# TIMES .... └─┴─┴─┘ **IF ZERO, SKIP TO JD12.**
A.	During (this approach/the most recent of these approaches), was D.M.E used to calculate the rate of descent for landing?	NO .... 0 YES .... 1 RF .... 7 DK 8

[illegible]

JD12.	During the last 60 days, how many times did an aircraft on which you were a crewmember land on a runway without VASI (vasi) or PAPI (papi)? VASI = VERTICAL APPROACH SLOPE INDICATOR PAPI = PRECISION APPROACH PATH INDICATOR	# TIMES ____ ☐☐☐ **IF ZERO, SKIP TO JD13**
A.	During the most recent of these events) would VASI (vasi) or PAPI (papi) have improved the aircraft's ability to land safely?	NO .... 0 YES .... 1 RF .... 7 DK 8

I would now like to ask you some questions about your airline's written standard operating procedures or S.O.Ps.

JD13.	Do your airline's written S.O.Ps include Controlled Flight into Terrain prevention, sometimes called C-FIT (C-fit)?	NO .... 0 YES .... 1 RF .... 7 DK 8
JD14.	Do your airline's written S.O.Ps talk about how to avoid circumstances that could lead to an in-flight loss of control?	NO .... 0 YES .... 1 RF .... 7 DK 8
JD15.	Do your airline's written S.O.P.s talk about how to perform recovery from unusual **attitudes** and departure from controlled flight?	NO .... 0 YES .... 1 RF .... 7 DK 8
JD16.	Do your airline's written S.O.Ps talk about how to avoid approach and landing accidents?	NO .... 0 YES .... 1 RF .... 7 DK 8
JD17.	Do your airline's written S.O.Ps talk about how to fly non-precision approaches?	NO .... 0 YES .... 1 RF .... 7 DK .... 8 NA 9
JD18.	Do your airline's written S.O.Ps require the use of constant angle non-precision approaches when that option is available?	NO .... 0 YES .... 1 RF .... 7 DK 8
JD19.	**Do your airline's written S.O.Ps talk about how to respond to E.G.P.W.S warnings?** EGPWS = ENHANCED GROUND PROXIMITY WARNING SYSTEM	NO .... 0 YES .... 1 RF .... 7 DK 8

Now I would like to ask some questions about your recurrent training. By recurrent training I mean training conducted periodically that is designed to maintain your skills and knowledge.

CLARIFICATION: This does not include transition or initial training. Recurrent training can include ground school, simulator training sessions, and any training conducted in the aircraft. I am going to read a list of issues. For each issue, please indicate if that topic or issue was covered during your last recurrent training.

JD20. **In what month and year did you receive your most recent recurrent training?**

MONTH .... ☐☐
YEAR .... ☐☐☐☐

JD21. **Did your most recent recurrent training talk about basic airmanship?**

NO 0
YES 1
RF 7
DK 8

A. **Did your most recent recurrent training talk about normal approach procedures?**

NO 0
YES 1
RF 7
DK 8

B. **Did your most recent recurrent training talk about approach briefings?**

NO 0
YES 1
RF 7
DK 8

C. **Did your most recent recurrent training talk about criteria for initiating go-around and missed approaches?**

NO 0
YES 1
RF 7
DK 8

D. **Did your most recent recurrent training talk about go-around and missed approach execution?**

NO 0
YES 1
RF 7
DK 8

E. **Did your most recent recurrent training talk about emergency or abnormal conditions procedures?**

NO 0
YES 1
RF 7
DK 8

Now I would like to ask you some questions concerning training you may have received addressing controlled flight into terrain, or C-FIT (C-fit), and other issues

JD22. **Have you received C-FIT (C-fit) prevention training from your airline?**

NO .... (SKIP TO JD23) 0
YES 1
RF .... (SKIP TO JD23) 7
DK .... (SKIP TO JD23) 8

A. **In what month and year did you receive your most recent C-FIT (C-fit) prevention training?**

MONTH .... ☐☐
YEAR .... ☐☐☐☐

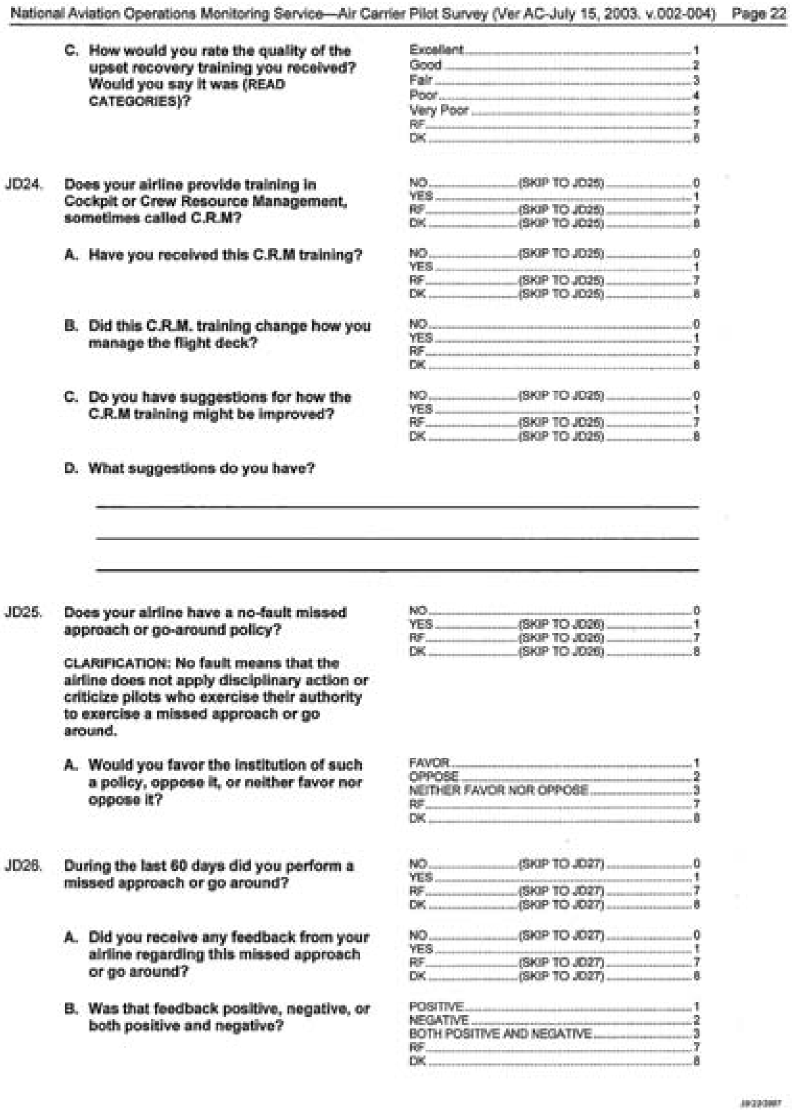
B. **Did your most recent C-FIT (C-fit) prevention training talk about minimum obstruction clearance altitudes or MOCA (mo ca)?**

NO 0
YES 1
RF 7
DK 8

C. **Did your most recent C-FIT (C-fit) prevention training talk about minimum enroute altitudes or M.E.A?**

NO 0
YES 1
RF 7
DK 8

	D. Did your most recent C-FIT (C-fit) prevention training talk about grid MORAs (mo ras)? MORA = MINIMUM OPERATING RADAR ALTITUDE	NO 0 YES 1 RF 7 DK 8
	E. Did your most recent C-FIT (C-fit) prevention training talk about G.P.W.S or E.G.P.W.S? GPWS = GROUND PROXIMITY WARNING SYSTEM EGPWS = ENHANCED GROUND PROXIMITY WARNING SYSTEM	NO 0 YES 1 RF 7 DK 8
	F. Did your most recent C-FIT (C-fit) prevention training talk about escape maneuvers in response to G.P.W.S or E.G.P.W.S warnings? GPWS = GROUND PROXIMITY WARNING SYSTEM EGPWS = ENHANCED GROUND PROXIMITY WARNING SYSTEM	NO 0 YES 1 RF 7 DK 8
	G. Did your most recent C-FIT (C-fit) prevention training talk about drift down procedures after engine failure?	NO 0 YES 1 RF 7 DK 8
	H. Did your most recent C-FIT (C-fit) prevention training talk about maintaining situational awareness?	NO 0 YES 1 RF 7 DK 8
	I. Did your most recent C-FIT (C-fit) prevention training talk about cockpit resource management, or C.R.M as it relates to C-FIT (C-fit) recovery? NOTE: CRM CAN ALSO = CREW RESOURCE MANAGEMENT	NO 0 YES 1 RF 7 DK 8
	J. How would you rate the quality of the most recent C-FIT (C-fit) prevention training you received from your airline? Would you say it was (READ CATEGORIES)?	Excellent 1 Good 2 Fair 3 Poor 4 Very Poor 5
JD23.	**Did you receive training specifically in upset recovery from your airline?**	NO (SKIP TO JD24) 0 YES 1 RF (SKIP TO JD24) 7 DK (SKIP TO JD24) 8
	A. In what month and year did you receive your most recent training in upset recovery?	MONTH |_|_| YEAR |_|_|_|_|
	B. Was this training received in a simulator, in a ground school, or both?	SIMULATOR 1 GROUND SCHOOL 2 BOTH 3 RF 7 DK 8



C. How would you rate the quality of the upset recovery training you received? Would you say it was (READ CATEGORIES)?

Excellent	1
Good	2
Fair	3
Poor	4
Very Poor	5
RF	7
DK	8

JD24. **Does your airline provide training in Cockpit or Crew Resource Management, sometimes called C.R.M?**

NO	(SKIP TO JD25)	0
YES		1
RF	(SKIP TO JD25)	7
DK	(SKIP TO JD25)	8

A. Have you received this C.R.M training?

NO	(SKIP TO JD25)	0
YES		1
RF	(SKIP TO JD25)	7
DK	(SKIP TO JD25)	8

B. Did this C.R.M. training change how you manage the flight deck?

NO	0
YES	1
RF	7
DK	8

C. Do you have suggestions for how the C.R.M training might be improved?

NO	(SKIP TO JD25)	0
YES		1
RF	(SKIP TO JD25)	7
DK	(SKIP TO JD25)	8

D. What suggestions do you have?

JD25. **Does your airline have a no-fault missed approach or go-around policy?**

CLARIFICATION: No fault means that the airline does not apply disciplinary action or criticize pilots who exercise their authority to exercise a missed approach or go around.

NO		0
YES	(SKIP TO JD26)	1
RF	(SKIP TO JD26)	7
DK	(SKIP TO JD26)	8

A. Would you favor the institution of such a policy, oppose it, or neither favor nor oppose it?

FAVOR	1
OPPOSE	2
NEITHER FAVOR NOR OPPOSE	3
RF	7
DK	8

JD26. **During the last 60 days did you perform a missed approach or go around?**

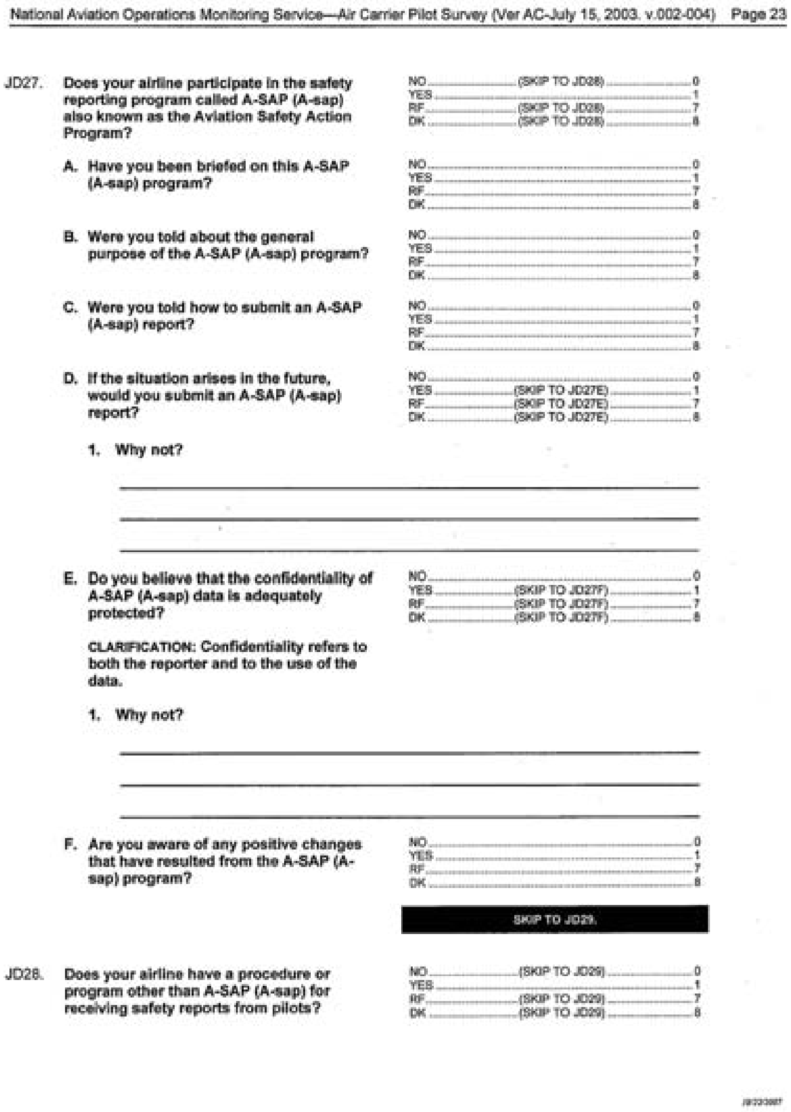
NO	(SKIP TO JD27)	0
YES		1
RF	(SKIP TO JD27)	7
DK	(SKIP TO JD27)	8

A. Did you receive any feedback from your airline regarding this missed approach or go around?

NO	(SKIP TO JD27)	0
YES		1
RF	(SKIP TO JD27)	7
DK	(SKIP TO JD27)	8

B. Was that feedback positive, negative, or both positive and negative?

POSITIVE	1
NEGATIVE	2
BOTH POSITIVE AND NEGATIVE	3
RF	7
DK	8



JD27. **Does your airline participate in the safety reporting program called A-SAP (A-sap) also known as the Aviation Safety Action Program?**

NO .... (SKIP TO JD28) 0
YES 1
RF .... (SKIP TO JD28) 7
DK .... (SKIP TO JD28) 8

A. **Have you been briefed on this A-SAP (A-sap) program?**

NO 0
YES 1
RF 7
DK 8

B. **Were you told about the general purpose of the A-SAP (A-sap) program?**

NO 0
YES 1
RF 7
DK 8

C. **Were you told how to submit an A-SAP (A-sap) report?**

NO 0
YES 1
RF 7
DK 8

D. **If the situation arises in the future, would you submit an A-SAP (A-sap) report?**

NO 0
YES .... (SKIP TO JD27E) 1
RF .... (SKIP TO JD27E) 7
DK .... (SKIP TO JD27E) 8

1. **Why not?**

E. **Do you believe that the confidentiality of A-SAP (A-sap) data is adequately protected?**

NO 0
YES .... (SKIP TO JD27F) 1
RF .... (SKIP TO JD27F) 7
DK .... (SKIP TO JD27F) 8

CLARIFICATION: Confidentiality refers to both the reporter and to the use of the data.

1. **Why not?**

F. **Are you aware of any positive changes that have resulted from the A-SAP (A-sap) program?**

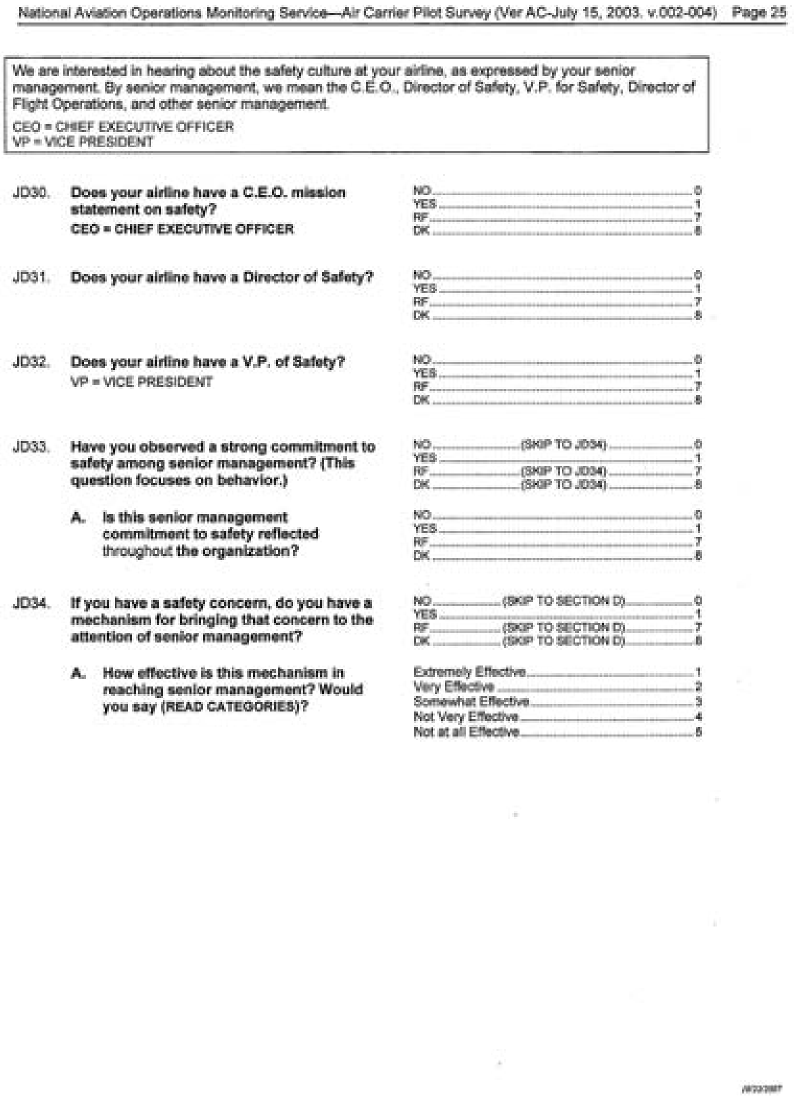
NO 0
YES 1
RF 7
DK 8

SKIP TO JD29.

JD28. **Does your airline have a procedure or program other than A-SAP (A-sap) for receiving safety reports from pilots?**

NO .... (SKIP TO JD29) 0
YES 1
RF .... (SKIP TO JD29) 7
DK .... (SKIP TO JD29) 8

	A. Are you aware of any positive changes that have resulted from this pilot reporting program?	NO .... 0 YES .... 1 RF .... 7 DK 8
	B. Would you favor the establishment of an A-SAP (A-sap) program, oppose it, or neither favor nor oppose it?	FAVOR .... 1 OPPOSE .... 2 NEITHER FAVOR NOR OPPOSE .... 3 RF .... 7 DK 8
JD29.	**Does your airline have a Flight Operations Quality Assurance Program, sometimes called FOQA (FO Qua)?**	NO .... (ASK JD29A) .... 0 YES .... (SKIP TO JD29B) .... 1 RF .... (SKIP TO JD30) .... 7 DK .... (SKIP TO JD30) 8
	CLARIFICATION: This is a program at some airlines that analyzes operational data routinely collected from the flight data recorders with concurrence and oversight by the pilot's union or association at that airline.	
	A. Would you favor the establishment of a FOQA (FO Qua) program at your airline, oppose it, or neither favor nor oppose?	FAVOR .... 1 OPPOSE .... 2 NEITHER FAVOR NOR OPPOSE .... 3 RF .... 7 DK 8
		SKIP TO JD30.
	B. Have you been briefed on the program?	NO .... 0 YES .... 1 RF .... 7 DK 8
	C. Do you believe that the confidentiality of FOQA (FO Qua) data is adequately protected?	NO .... 0 YES .... 1 RF .... 7 DK 8
	CLARIFICATION: Confidentiality refers to both the identity of the pilot flying the aircraft and to the use of the data.	
	D. Are you aware of any safety improvements that have resulted from the FOQA (FO Qua) program?	NO .... 0 YES .... 1 RF .... 7 DK 8



We are interested in hearing about the safety culture at your airline, as expressed by your senior management. By senior management, we mean the C.E.O., Director of Safety, V.P. for Safety, Director of Flight Operations, and other senior management.

CEO = CHIEF EXECUTIVE OFFICER
VP = VICE PRESIDENT

JD30.	**Does your airline have a C.E.O. mission statement on safety?** **CEO = CHIEF EXECUTIVE OFFICER**	NO		0
		YES		1
		RF		7
		DK		8
JD31.	**Does your airline have a Director of Safety?**	NO		0
		YES		1
		RF		7
		DK		8
JD32.	**Does your airline have a V.P. of Safety?** VP = VICE PRESIDENT	NO		0
		YES		1
		RF		7
		DK		8
JD33.	**Have you observed a strong commitment to safety among senior management? (This question focuses on behavior.)**	NO	(SKIP TO JD34)	0
		YES		1
		RF	(SKIP TO JD34)	7
		DK	(SKIP TO JD34)	8
	A. Is this senior management commitment to safety reflected throughout **the organization?**	NO		0
		YES		1
		RF		7
		DK		8
JD34.	**If you have a safety concern, do you have a mechanism for bringing that concern to the attention of senior management?**	NO	(SKIP TO SECTION D)	0
		YES		1
		RF	(SKIP TO SECTION D)	7
		DK	(SKIP TO SECTION D)	8
	A. How effective is this mechanism in reaching senior management? Would you say (READ CATEGORIES)?	Extremely Effective		1
		Very Effective		2
		Somewhat Effective		3
		Not Very Effective		4
		Not at all Effective		5

SECTION D: QUESTIONNAIRE FEEDBACK

INTRODUCTION:

I only have a couple more questions and these are about your reactions to the survey we have just done.

D1. How confident are you that you accurately counted all of the safety-related events that I asked you about? Would you say you were (READ QUESTIONS)?

Not confident at all	1
Slightly confident	2
Moderately confident	3
Very confident	4
Extremely confident	5
RF	7
DK	8

D2. Were any of the questions I asked confusing, poorly worded, or ambiguous?

YES		1
NO	(SKIP TO D3)	0
RF	(SKIP TO D3)	7
DK	(SKIP TO D3)	8

A. Could you please describe these question problems? RECORD VERBATIM. AT COMPLETION OF INTERVIEW, ENTER QUESTION NUMBER.

QUESTION NUMBER	RECORD VERBATIM

D3. Are there any safety problems happening within the national aviation system that I did not ask about but that you think may be worth asking about in further surveys?

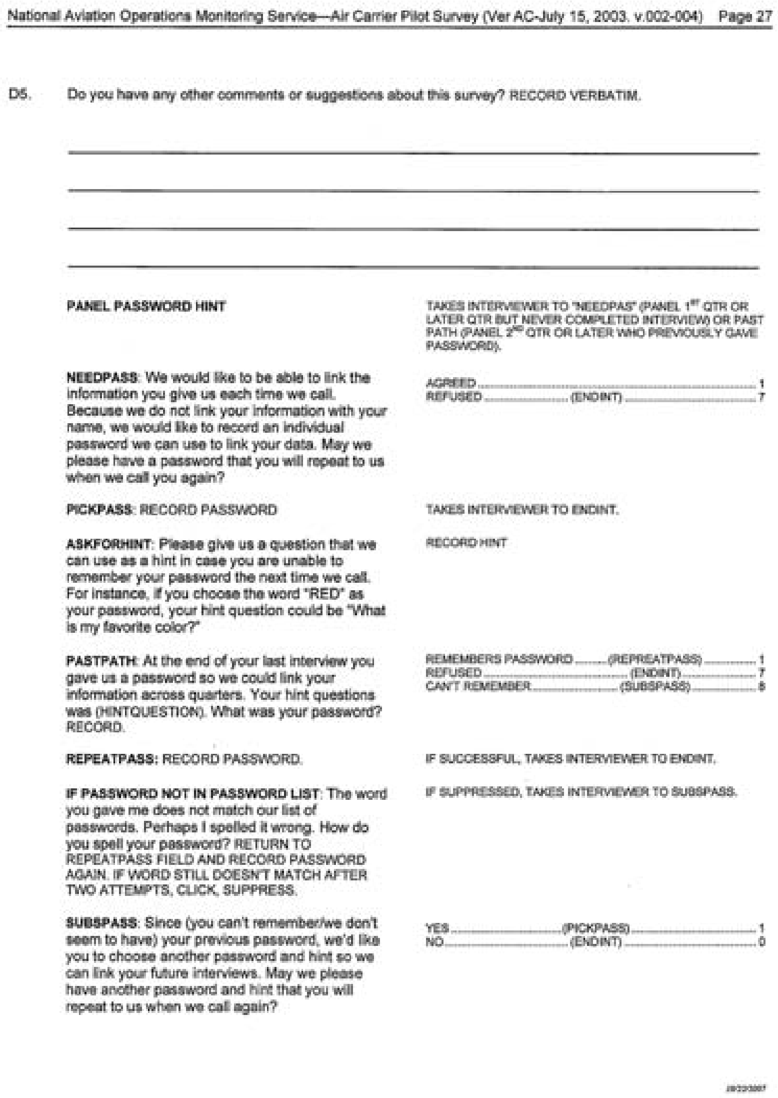
YES		1
NO	(SKIP TO D4)	0
RF	(SKIP TO D4)	7
DK	(SKIP TO D4)	8

A. What are these problems?

SPECIFY: ______________________________

D4. Do you use the internet at home?

YES	1
NO	0
RF	7
DK	8

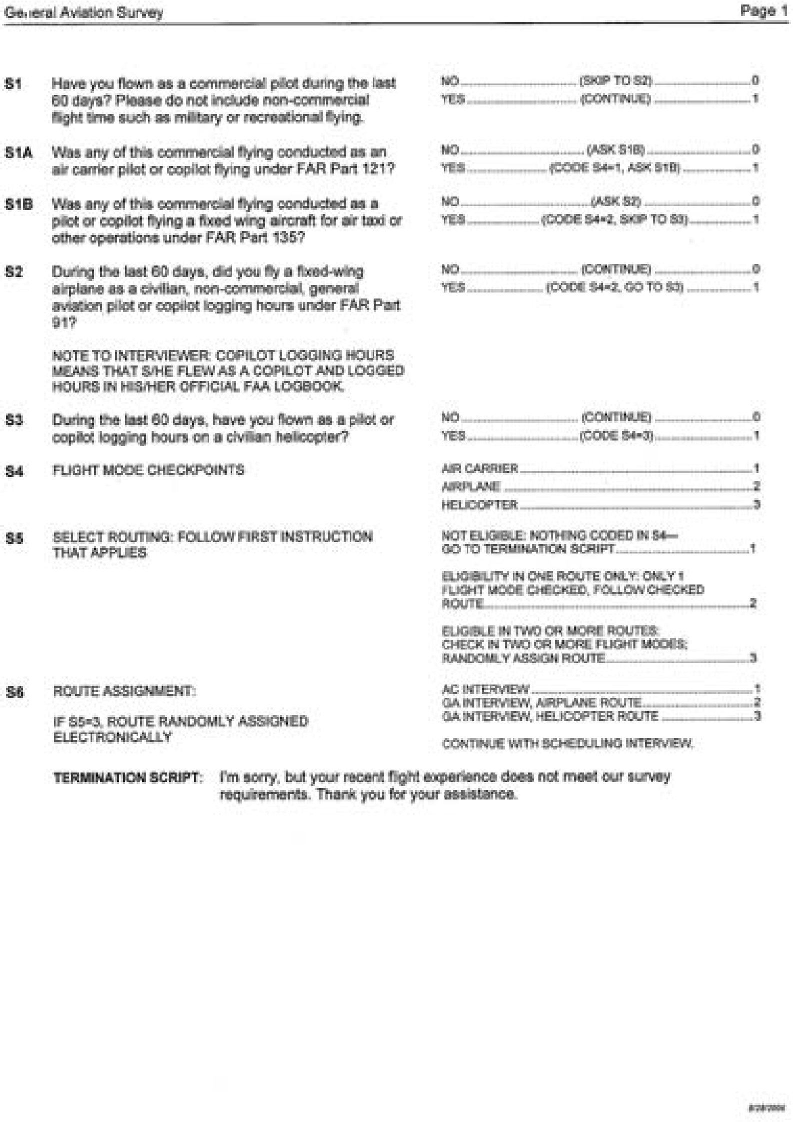


D5. Do you have any other comments or suggestions about this survey? RECORD VERBATIM.

PANEL PASSWORD HINT	TAKES INTERVIEWER TO "NEEDPAS" (PANEL 1^{ST} QTR OR LATER QTR BUT NEVER COMPLETED INTERVIEW) OR PAST PATH (PANEL 2^{ND} QTR OR LATER WHO PREVIOUSLY GAVE PASSWORD).
NEEDPASS: We would like to be able to link the information you give us each time we call. Because we do not link your information with your name, we would like to record an individual password we can use to link your data. May we please have a password that you will repeat to us when we call you again?	AGREED .... 1 REFUSED .... (ENDINT) 7
PICKPASS: RECORD PASSWORD	TAKES INTERVIEWER TO ENDINT.
ASKFORHINT: Please give us a question that we can use as a hint in case you are unable to remember your password the next time we call. For instance, if you choose the word "RED" as your password, your hint question could be "What is my favorite color?"	RECORD HINT
PASTPATH: At the end of your last interview you gave us a password so we could link your information across quarters. Your hint questions was (HINTQUESTION). What was your password? RECORD.	REMEMBERS PASSWORD .... (REPREATPASS) .... 1 REFUSED .... (ENDINT) .... 7 CAN'T REMEMBER .... (SUBSPASS) 8
REPEATPASS: RECORD PASSWORD.	IF SUCCESSFUL, TAKES INTERVIEWER TO ENDINT.
IF PASSWORD NOT IN PASSWORD LIST: The word you gave me does not match our list of passwords. Perhaps I spelled it wrong. How do you spell your password? RETURN TO REPEATPASS FIELD AND RECORD PASSWORD AGAIN. IF WORD STILL DOESN'T MATCH AFTER TWO ATTEMPTS, CLICK, SUPPRESS.	IF SUPPRESSED, TAKES INTERVIEWER TO SUBSPASS.
SUBSPASS: Since (you can't remember/we don't seem to have) your previous password, we'd like you to choose another password and hint so we can link your future interviews. May we please have another password and hint that you will repeat to us when we call again?	YES .... (PICKPASS) .... 1 NO .... (ENDINT) 0

ENDINT Again, thank you very much for your time and your help with this survey. Your input will help the aviation industry a great deal to measure the level of safety in the aviation system and will be held in confidence.
IF PANEL MEMBER: We'll be calling again in three months for your (2nd/3rd/last) interview.

QUESTIONNAIRE LENGTH: QUESTIONNAIRE LENGTH (MINUTES) .... ☐☐☐

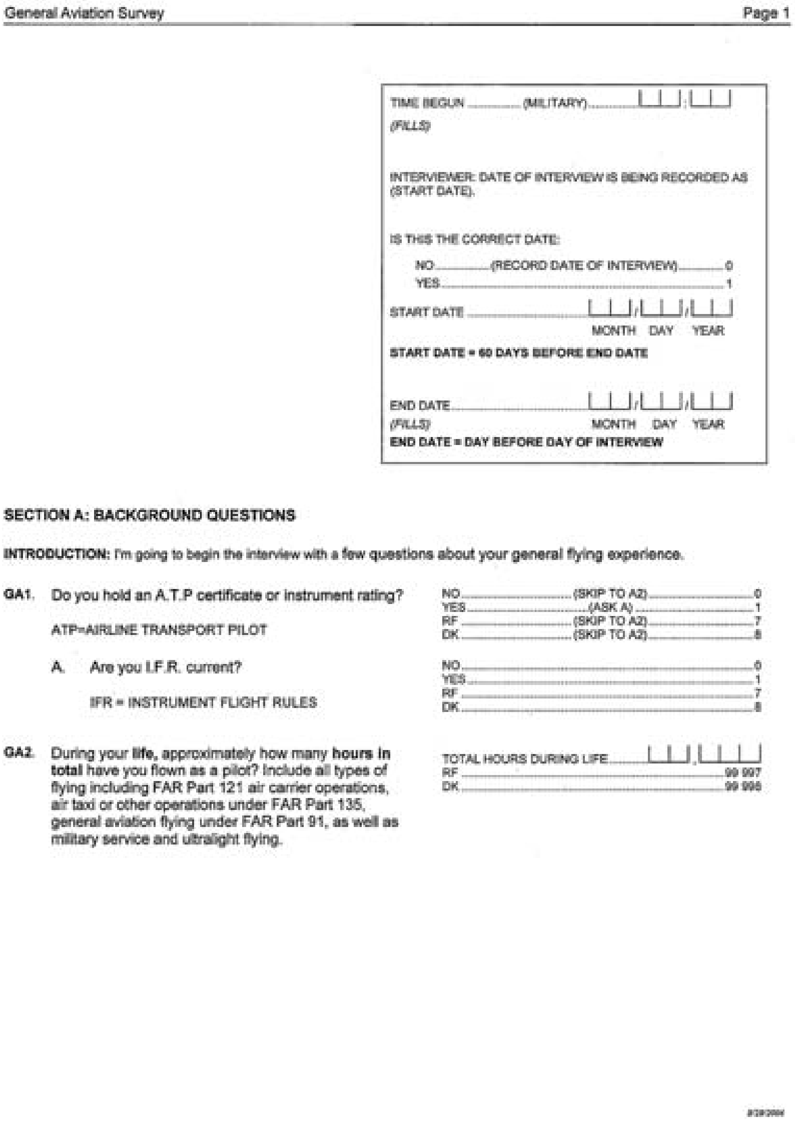


General Aviation Survey Page 1

S1	Have you flown as a commercial pilot during the last 60 days? Please do not include non-commercial flight time such as military or recreational flying.	NO .... (SKIP TO S2) .... 0 YES .... (CONTINUE) 1
S1A	Was any of this commercial flying conducted as an air carrier pilot or copilot flying under FAR Part 121?	NO .... (ASK S1B) .... 0 YES .... (CODE S4=1, ASK S1B) 1
S1B	Was any of this commercial flying conducted as a pilot or copilot flying a fixed wing aircraft for air taxi or other operations under FAR Part 135?	NO .... (ASK S2) .... 0 YES .... (CODE S4=2, SKIP TO S3) 1
S2	During the last 60 days, did you fly a fixed-wing airplane as a civilian, non-commercial, general aviation pilot or copilot logging hours under FAR Part 91? NOTE TO INTERVIEWER: COPILOT LOGGING HOURS MEANS THAT S/HE FLEW AS A COPILOT AND LOGGED HOURS IN HIS/HER OFFICIAL FAA LOGBOOK.	NO .... (CONTINUE) .... 0 YES .... (CODE S4=2, GO TO S3) 1
S3	During the last 60 days, have you flown as a pilot or copilot logging hours on a civilian helicopter?	NO .... (CONTINUE) .... 0 YES .... (CODE S4=3) 1
S4	FLIGHT MODE CHECKPOINTS	AIR CARRIER .... 1 AIRPLANE .... 2 HELICOPTER 3
S5	SELECT ROUTING: FOLLOW FIRST INSTRUCTION THAT APPLIES	NOT ELIGIBLE: NOTHING CODED IN S4— GO TO TERMINATION SCRIPT .... 1 ELIGIBILITY IN ONE ROUTE ONLY: ONLY 1 FLIGHT MODE CHECKED, FOLLOW CHECKED ROUTE .... 2 ELIGIBLE IN TWO OR MORE ROUTES: CHECK IN TWO OR MORE FLIGHT MODES; RANDOMLY ASSIGN ROUTE 3
S6	ROUTE ASSIGNMENT: IF S5=3, ROUTE RANDOMLY ASSIGNED ELECTRONICALLY	AC INTERVIEW .... 1 GA INTERVIEW, AIRPLANE ROUTE .... 2 GA INTERVIEW, HELICOPTER ROUTE .... 3 CONTINUE WITH SCHEDULING INTERVIEW.

TERMINATION SCRIPT: I'm sorry, but your recent flight experience does not meet our survey requirements. Thank you for your assistance.

[illegible]



TIME BEGUN .... (MILITARY)............ ⎿⏊⏌:⎿⏊⏌
(FILLS)

INTERVIEWER: DATE OF INTERVIEW IS BEING RECORDED AS (START DATE).

IS THIS THE CORRECT DATE:

NO.............. (RECORD DATE OF INTERVIEW).......... 0
YES.. 1

START DATE .... ⎿⏊⏌/⎿⏊⏌/⎿⏊⏌
MONTH DAY YEAR

START DATE = 60 DAYS BEFORE END DATE

END DATE............................ ⎿⏊⏌/⎿⏊⏌/⎿⏊⏌
(FILLS) MONTH DAY YEAR
END DATE = DAY BEFORE DAY OF INTERVIEW

SECTION A: BACKGROUND QUESTIONS

INTRODUCTION: I'm going to begin the interview with a few questions about your general flying experience.

GA1. Do you hold an A.T.P certificate or instrument rating?

ATP=AIRLINE TRANSPORT PILOT

NO.......................... (SKIP TO A2)........................ 0
YES.......................... (ASK A)........................ 1
RF.......................... (SKIP TO A2)........................ 7
DK.......................... (SKIP TO A2)........................ 8

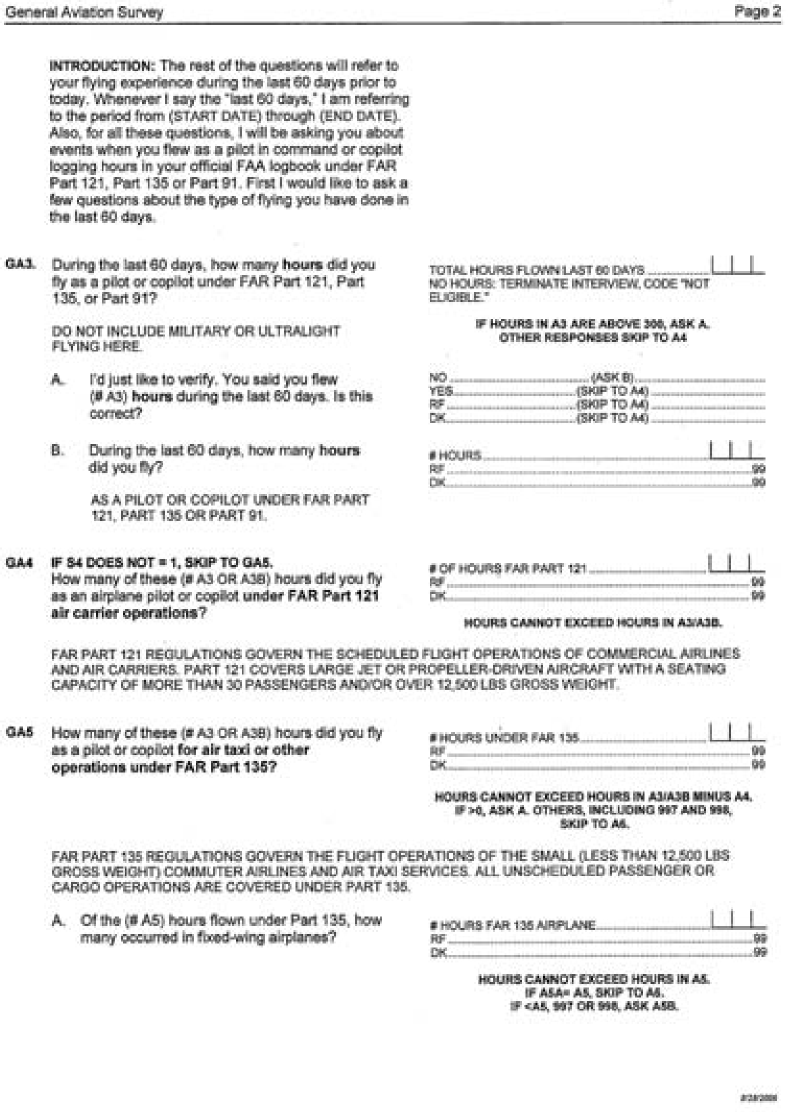
A. Are you I.F.R. current?

IFR = INSTRUMENT FLIGHT RULES

NO.. 0
YES.. 1
RF.. 7
DK.. 8

GA2. During your **life,** approximately how many **hours in total** have you flown as a pilot? Include all types of flying including FAR Part 121 air carrier operations, air taxi or other operations under FAR Part 135, general aviation flying under FAR Part 91, as well as military service and ultralight flying.

TOTAL HOURS DURING LIFE........ ⎿⏊⏌,⎿⏊⏊⏌
RF.. 99 997
DK.. 99 998



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INTRODUCTION: The rest of the questions will refer to your flying experience during the last 60 days prior to today. Whenever I say the "last 60 days," I am referring to the period from (START DATE) through (END DATE). Also, for all these questions, I will be asking you about events when you flew as a pilot in command or copilot logging hours in your official FAA logbook under FAR Part 121, Part 135 or Part 91. First I would like to ask a few questions about the type of flying you have done in the last 60 days.

GA3. During the last 60 days, how many **hours** did you fly as a pilot or copilot under FAR Part 121, Part 135, or Part 91?

DO NOT INCLUDE MILITARY OR ULTRALIGHT FLYING HERE.

TOTAL HOURS FLOWN LAST 60 DAYS .... |__|__|__|
NO HOURS: TERMINATE INTERVIEW, CODE "NOT ELIGIBLE."

IF HOURS IN A3 ARE ABOVE 300, ASK A. OTHER RESPONSES SKIP TO A4

A. I'd just like to verify. You said you flew (# A3) **hours** during the last 60 days. Is this correct?

NO .... (ASK B) ....
YES .... (SKIP TO A4) ....
RF .... (SKIP TO A4) ....
DK .... (SKIP TO A4) ....

B. During the last 60 days, how many **hours** did you fly?

AS A PILOT OR COPILOT UNDER FAR PART 121, PART 135 OR PART 91.

HOURS .... |__|__|__|
RF 99
DK 99

GA4 **IF S4 DOES NOT = 1, SKIP TO GA5.**
How many of these (# A3 OR A3B) hours did you fly as an airplane pilot or copilot **under FAR Part 121 air carrier operations?**

OF HOURS FAR PART 121 .... |__|__|__|
RF 99
DK 99

HOURS CANNOT EXCEED HOURS IN A3/A3B.

FAR PART 121 REGULATIONS GOVERN THE SCHEDULED FLIGHT OPERATIONS OF COMMERCIAL AIRLINES AND AIR CARRIERS. PART 121 COVERS LARGE JET OR PROPELLER-DRIVEN AIRCRAFT WITH A SEATING CAPACITY OF MORE THAN 30 PASSENGERS AND/OR OVER 12,500 LBS GROSS WEIGHT.

GA5 How many of these (# A3 OR A3B) hours did you fly as a pilot or copilot **for air taxi or other operations under FAR Part 135?**

HOURS UNDER FAR 135 .... |__|__|__|
RF 99
DK 99

HOURS CANNOT EXCEED HOURS IN A3/A3B MINUS A4. IF >0, ASK A. OTHERS, INCLUDING 997 AND 998, SKIP TO A6.

FAR PART 135 REGULATIONS GOVERN THE FLIGHT OPERATIONS OF THE SMALL (LESS THAN 12,500 LBS GROSS WEIGHT) COMMUTER AIRLINES AND AIR TAXI SERVICES. ALL UNSCHEDULED PASSENGER OR CARGO OPERATIONS ARE COVERED UNDER PART 135.

A. Of the (# A5) hours flown under Part 135, how many occurred in fixed-wing airplanes?

HOURS FAR 135 AIRPLANE .... |__|__|__|
RF 99
DK 99

HOURS CANNOT EXCEED HOURS IN A5. IF A5A= A5, SKIP TO A6. IF <A5, 997 OR 998, ASK A5B.

[illegible]

B. Of the (# A5) hours flown under Part 135, how many occurred in helicopters?

HOURS FAR 135 HELICOPTER........ |_|_|_|
RF........99
DK........99

HOURS CANNOT EXCEED HOURS IN A5 MINUS A5A.

GA6. How many of these (# A3 OR A3B) hours did you fly as a general aviation pilot or copilot under FAR Part 91?

HOURS UNDER FAR 91 .... └─┴─┴─┘
RF 997
DK 998

HOURS CANNOT EXCEED HOURS IN A3/A3B MINUS SUM (A4 PLUS A5).
IF >0, ASK A. OTHERS, INCLUDING 997 AND 998, SKIP TO A7.

FAR PART 91 REGULATIONS COVER BASIC AND GENERAL RULES FOR ALL AIRCRAFT OPERATIONS. PART 91 GOVERNS THE OPERATION OF BUSINESS AIRCRAFT AND AIRCRAFT USED BY GENERAL AVIATION PILOTS WHO FLY FOR PLEASURE.

A. Of the (# A6) hours flown under Part 91, how many occurred in fixed-wing airplanes?

HOURS FAR 91 AIRPLANE .... └─┴─┴─┘
RF 997
DK 998

HOURS CANNOT EXCEED HOURS IN A6.
IF A6A= A6, SKIP TO A7.
IF <A6, 997 OR 998, ASK A6B.

B. Of the (# A6) hours flown under Part 91, how many occurred in helicopters?

HOURS FAR 91 HELICOPTER .... └─┴─┴─┘
RF 997
DK 998

HOURS CANNOT EXCEED HOURS IN A6 MINUS A6A.

INTRODUCTION: Now I'd like to ask a few questions about the number of **takeoffs or flights** you made during the last 60 days. We use the terms "flight" throughout this interview to mean the period of time between each takeoff and landing, even if that time is short such as for instructors teaching students to land and "touch and goes." READ A7-A11 WHEN APPLICABLE.

TOUCH AND GOES = VERY SHORT FLIGHTS WHEN PRACTICING TAKEOFFS AND LANDINGS.

GA7. **IF A4 = 0, 7, OR 8, SKIPT TO A8. IF A4 > 0, READ:** During the (# A4) hours you flew as an **airplane pilot or copilot under FAR Part 121**, how many distinct **flight legs** did you experience?

OF LEGS/TAKEOFFS PART 121 .... └─┴─┴─┘
RF 997
DK 998

GA8. **IF A5A = 0, 7, OR 8, SKIP TO A9. IF A5A > 0, READ:** During the (# A5A) hours you flew as an **airplane pilot or copilot under FAR Part 135,** how many **takeoffs** did you experience?

PART 135 AIRPLANE TAKEOFFS .... └─┴─┴─┘
RF 997
DK 998

IF A8 BLANK, 0, 997 OR 998, SKIP TO A9.

A. (For how many of these (# A8) flights/For this flight) were you the pilot in command?

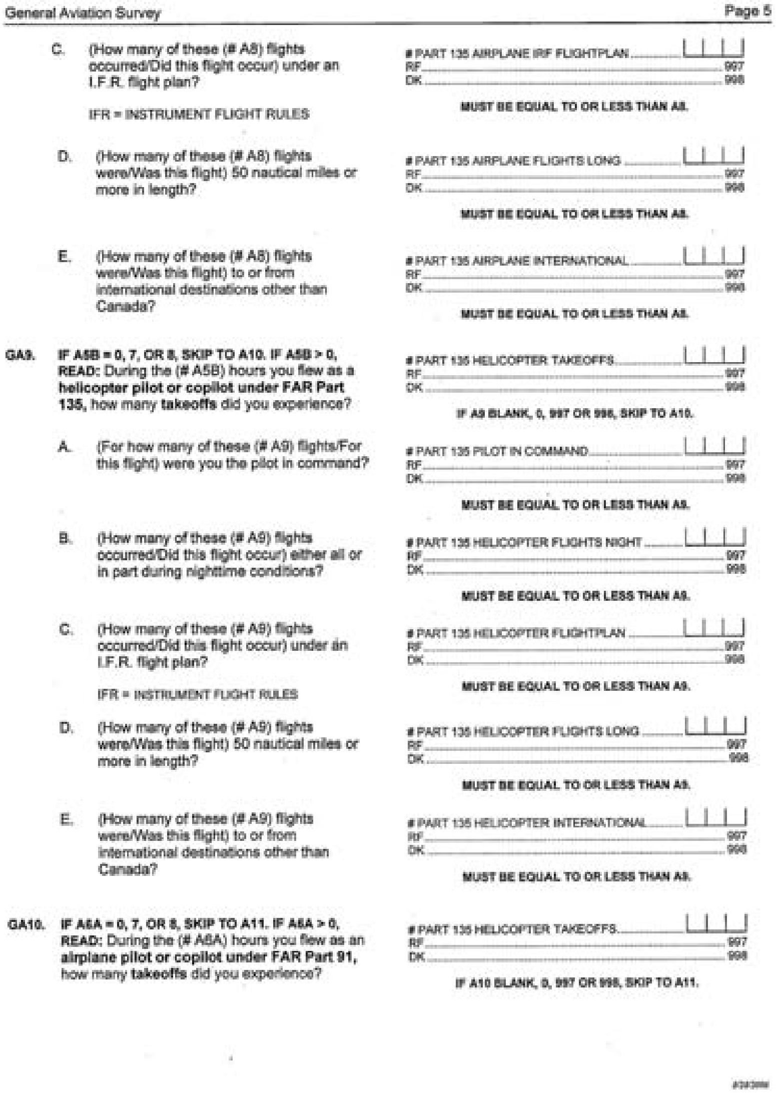
PART 135 AIRPLANE PILOT IN COMMAND .... └─┴─┴─┘
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A8.

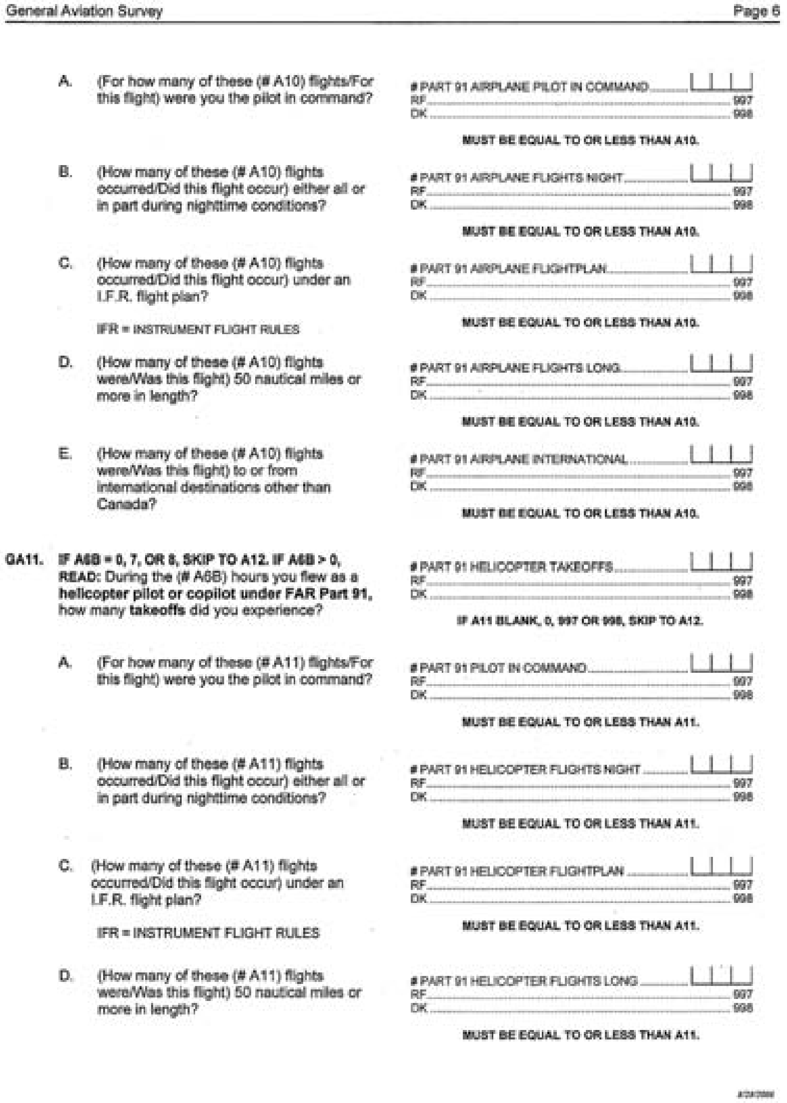
B. (How many of these (# A8) flights occurred/Did this flight occur) either all or in part during nighttime conditions?

PART 135 AIRPLANE FLIGHTS NIGHT .... └─┴─┴─┘
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A8.



	C. (How many of these (# A8) flights occurred/Did this flight occur) under an I.F.R. flight plan? IFR = INSTRUMENT FLIGHT RULES	# PART 135 AIRPLANE IRF FLIGHTPLAN .... └┴┴┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A8.**
	D. (How many of these (# A8) flights were/Was this flight) 50 nautical miles or more in length?	# PART 135 AIRPLANE FLIGHTS LONG .... └┴┴┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A8.**
	E. (How many of these (# A8) flights were/Was this flight) to or from international destinations other than Canada?	# PART 135 AIRPLANE INTERNATIONAL .... └┴┴┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A8.**
GA9.	**IF A5B = 0, 7, OR 8, SKIP TO A10. IF A5B > 0, READ:** During the (# A5B) hours you flew as a **helicopter pilot or copilot under FAR Part 135,** how many **takeoffs** did you experience?	# PART 135 HELICOPTER TAKEOFFS .... └┴┴┘ RF .... 997 DK .... 998 **IF A9 BLANK, 0, 997 OR 998, SKIP TO A10.**
	A. (For how many of these (# A9) flights/For this flight) were you the pilot in command?	# PART 135 PILOT IN COMMAND .... └┴┴┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A9.**
	B. (How many of these (# A9) flights occurred/Did this flight occur) either all or in part during nighttime conditions?	# PART 135 HELICOPTER FLIGHTS NIGHT .... └┴┴┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A9.**
	C. (How many of these (# A9) flights occurred/Did this flight occur) under an I.F.R. flight plan? IFR = INSTRUMENT FLIGHT RULES	# PART 135 HELICOPTER FLIGHTPLAN .... └┴┴┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A9.**
	D. (How many of these (# A9) flights were/Was this flight) 50 nautical miles or more in length?	# PART 135 HELICOPTER FLIGHTS LONG .... └┴┴┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A9.**
	E. (How many of these (# A9) flights were/Was this flight) to or from international destinations other than Canada?	# PART 135 HELICOPTER INTERNATIONAL .... └┴┴┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A9.**
GA10.	**IF A6A = 0, 7, OR 8, SKIP TO A11. IF A6A > 0, READ:** During the (# A6A) hours you flew as an **airplane pilot or copilot under FAR Part 91,** how many **takeoffs** did you experience?	# PART 135 HELICOPTER TAKEOFFS .... └┴┴┘ RF .... 997 DK .... 998 **IF A10 BLANK, 0, 997 OR 998, SKIP TO A11.**



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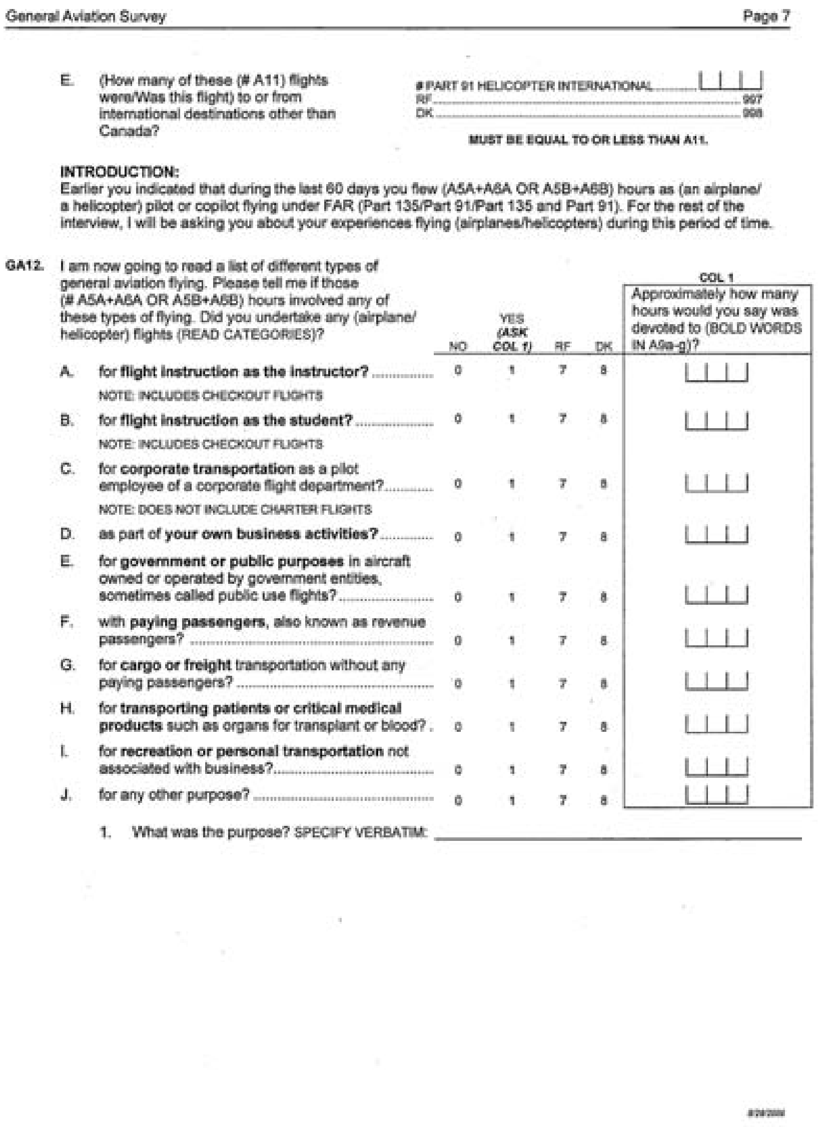
A.	(For how many of these (# A10) flights/For this flight) were you the pilot in command?	# PART 91 AIRPLANE PILOT IN COMMAND .... └─┴─┴─┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A10.**
B.	(How many of these (# A10) flights occurred/Did this flight occur) either all or in part during nighttime conditions?	# PART 91 AIRPLANE FLIGHTS NIGHT .... └─┴─┴─┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A10.**
C.	(How many of these (# A10) flights occurred/Did this flight occur) under an I.F.R. flight plan? IFR = INSTRUMENT FLIGHT RULES	# PART 91 AIRPLANE FLIGHTPLAN .... └─┴─┴─┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A10.**
D.	(How many of these (# A10) flights were/Was this flight) 50 nautical miles or more in length?	# PART 91 AIRPLANE FLIGHTS LONG .... └─┴─┴─┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A10.**
E.	(How many of these (# A10) flights were/Was this flight) to or from international destinations other than Canada?	# PART 91 AIRPLANE INTERNATIONAL .... └─┴─┴─┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A10.**
GA11.	**IF A6B = 0, 7, OR 8, SKIP TO A12. IF A6B > 0, READ:** During the (# A6B) hours you flew as a **helicopter pilot or copilot under FAR Part 91,** how many **takeoffs** did you experience?	# PART 91 HELICOPTER TAKEOFFS .... └─┴─┴─┘ RF .... 997 DK .... 998 **IF A11 BLANK, 0, 997 OR 998, SKIP TO A12.**
A.	(For how many of these (# A11) flights/For this flight) were you the pilot in command?	# PART 91 PILOT IN COMMAND .... └─┴─┴─┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A11.**
B.	(How many of these (# A11) flights occurred/Did this flight occur) either all or in part during nighttime conditions?	# PART 91 HELICOPTER FLIGHTS NIGHT .... └─┴─┴─┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A11.**
C.	(How many of these (# A11) flights occurred/Did this flight occur) under an I.F.R. flight plan? IFR = INSTRUMENT FLIGHT RULES	# PART 91 HELICOPTER FLIGHTPLAN .... └─┴─┴─┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A11.**
D.	(How many of these (# A11) flights were/Was this flight) 50 nautical miles or more in length?	# PART 91 HELICOPTER FLIGHTS LONG .... └─┴─┴─┘ RF .... 997 DK .... 998 **MUST BE EQUAL TO OR LESS THAN A11.**



E. (How many of these (# A11) flights were/Was this flight) to or from international destinations other than Canada?

PART 91 HELICOPTER INTERNATIONAL ☐☐☐
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A11.

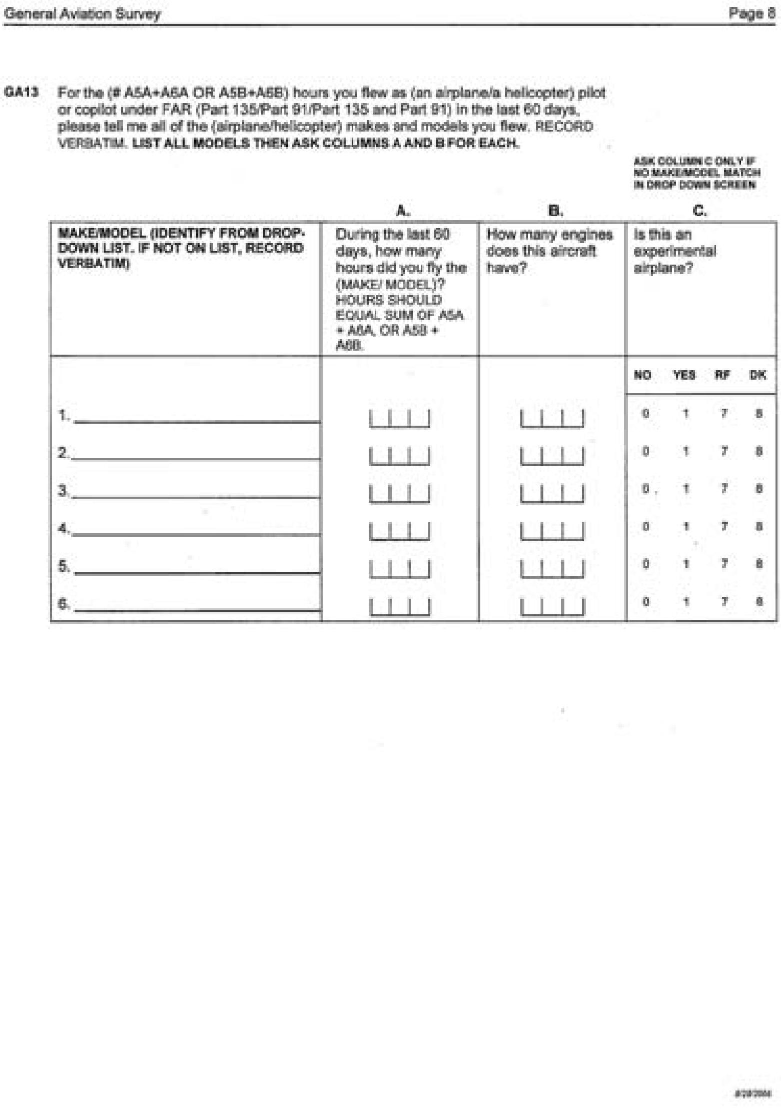
INTRODUCTION:
Earlier you indicated that during the last 60 days you flew (A5A+A6A OR A5B+A6B) hours as (an airplane/a helicopter) pilot or copilot flying under FAR (Part 135/Part 91/Part 135 and Part 91). For the rest of the interview, I will be asking you about your experiences flying (airplanes/helicopters) during this period of time.

GA12. I am now going to read a list of different types of general aviation flying. Please tell me if those (# A5A+A6A OR A5B+A6B) hours involved any of these types of flying. Did you undertake any (airplane/helicopter) flights (READ CATEGORIES)?

		NO	YES *(ASK COL 1)*	RF	DK	COL 1 Approximately how many hours would you say was devoted to (BOLD WORDS IN A9a-g)?
A.	for **flight instruction as the instructor?**	0	1	7	8	☐☐☐
	NOTE: INCLUDES CHECKOUT FLIGHTS					
B.	for **flight instruction as the student?**	0	1	7	8	☐☐☐
	NOTE: INCLUDES CHECKOUT FLIGHTS					
C.	for **corporate transportation** as a pilot employee of a corporate flight department?	0	1	7	8	☐☐☐
	NOTE: DOES NOT INCLUDE CHARTER FLIGHTS					
D.	as part of **your own business activities?**	0	1	7	8	☐☐☐
E.	for **government or public purposes** in aircraft owned or operated by government entities, sometimes called public use flights?	0	1	7	8	☐☐☐
F.	with **paying passengers**, also known as revenue passengers?	0	1	7	8	☐☐☐
G.	for **cargo or freight** transportation without any paying passengers?	0	1	7	8	☐☐☐
H.	for **transporting patients or critical medical products** such as organs for transplant or blood?	0	1	7	8	☐☐☐
I.	for **recreation or personal transportation** not associated with business?	0	1	7	8	☐☐☐
J.	for any other purpose?	0	1	7	8	☐☐☐

1. What was the purpose? SPECIFY VERBATIM: ____________________

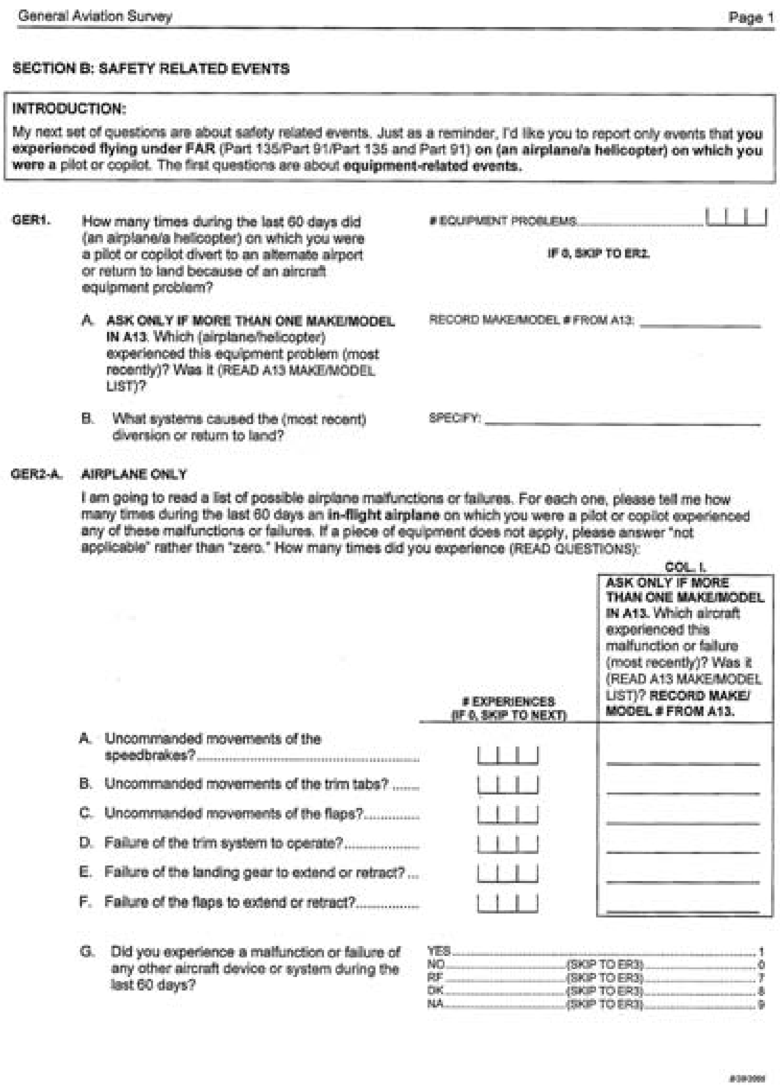
[illegible]



GA13 For the (# A5A+A6A OR A5B+A6B) hours you flew as (an airplane/a helicopter) pilot or copilot under FAR (Part 135/Part 91/Part 135 and Part 91) in the last 60 days, please tell me all of the (airplane/helicopter) makes and models you flew. RECORD VERBATIM. **LIST ALL MODELS THEN ASK COLUMNS A AND B FOR EACH.**

ASK COLUMN C ONLY IF NO MAKE/MODEL MATCH IN DROP DOWN SCREEN

	A.	B.	C.			
MAKE/MODEL (IDENTIFY FROM DROP-DOWN LIST. IF NOT ON LIST, RECORD VERBATIM)	During the last 60 days, how many hours did you fly the (MAKE/ MODEL)? HOURS SHOULD EQUAL SUM OF A5A + A6A, OR A5B + A6B.	How many engines does this aircraft have?	Is this an experimental airplane?			
			NO	**YES**	**RF**	**DK**
1. ____________	|_|_|_|	|_|_|_|	0	1	7	8
2. ____________	|_|_|_|	|_|_|_|	0	1	7	8
3. ____________	|_|_|_|	|_|_|_|	0	1	7	8
4. ____________	|_|_|_|	|_|_|_|	0	1	7	8
5. ____________	|_|_|_|	|_|_|_|	0	1	7	8
6. ____________	|_|_|_|	|_|_|_|	0	1	7	8



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SECTION B: SAFETY RELATED EVENTS

INTRODUCTION:

My next set of questions are about safety related events. Just as a reminder, I'd like you to report only events that **you experienced flying under FAR** (Part 135/Part 91/Part 135 and Part 91) **on (an airplane/a helicopter) on which you were a** pilot or copilot. The first questions are about **equipment-related events.**

GER1. How many times during the last 60 days did (an airplane/a helicopter) on which you were a pilot or copilot divert to an alternate airport or return to land because of an aircraft equipment problem?

EQUIPMENT PROBLEMS.......................... ☐☐☐

IF 0, SKIP TO ER2.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/helicopter) experienced this equipment problem (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: ________________

B. What systems caused the (most recent) diversion or return to land?

SPECIFY: ________________________________

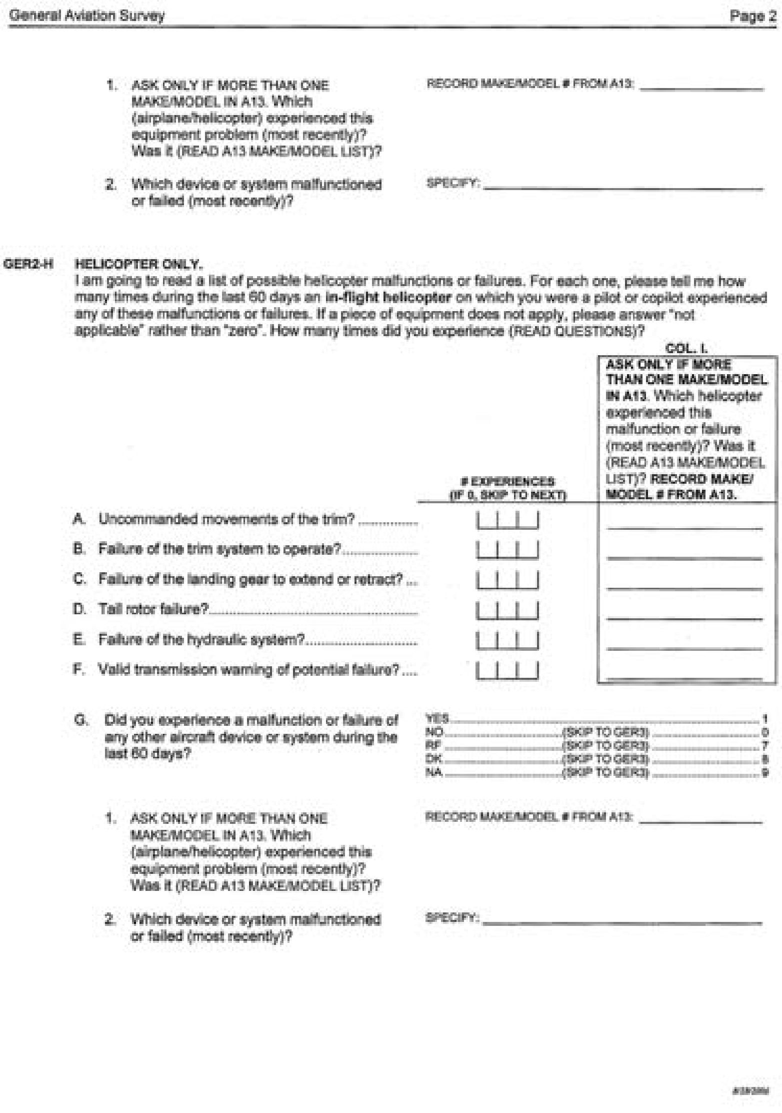
GER2-A. AIRPLANE ONLY

I am going to read a list of possible airplane malfunctions or failures. For each one, please tell me how many times during the last 60 days an **in-flight airplane** on which you were a pilot or copilot experienced any of these malfunctions or failures. If a piece of equipment does not apply, please answer "not applicable" rather than "zero." How many times did you experience (READ QUESTIONS):

	# EXPERIENCES (IF 0, SKIP TO NEXT)	COL. I. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which aircraft experienced this malfunction or failure (most recently)? Was it (READ A13 MAKE/MODEL LIST)? **RECORD MAKE/ MODEL # FROM A13.**
A. Uncommanded movements of the speedbrakes?..............................	☐☐☐	____________
B. Uncommanded movements of the trim tabs?	☐☐☐	____________
C. Uncommanded movements of the flaps?..............	☐☐☐	____________
D. Failure of the trim system to operate?..................	☐☐☐	____________
E. Failure of the landing gear to extend or retract? ...	☐☐☐	____________
F. Failure of the flaps to extend or retract?...............	☐☐☐	____________

G. Did you experience a malfunction or failure of any other aircraft device or system during the last 60 days?

YES..		1
NO....................................	(SKIP TO ER3)........................	0
RF....................................	(SKIP TO ER3)........................	7
DK....................................	(SKIP TO ER3)........................	8
NA....................................	(SKIP TO ER3)........................	9



1. ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13. Which (airplane/helicopter) experienced this equipment problem (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: ______________

2. Which device or system malfunctioned or failed (most recently)?

SPECIFY: ______________________________

GER2-H **HELICOPTER ONLY.**
I am going to read a list of possible helicopter malfunctions or failures. For each one, please tell me how many times during the last 60 days an **in-flight helicopter** on which you were a pilot or copilot experienced any of these malfunctions or failures. If a piece of equipment does not apply, please answer "not applicable" rather than "zero". How many times did you experience (READ QUESTIONS)?

	# EXPERIENCES (IF 0, SKIP TO NEXT)	COL. I. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which helicopter experienced this malfunction or failure (most recently)? Was it (READ A13 MAKE/MODEL LIST)? **RECORD MAKE/ MODEL # FROM A13.**
A. Uncommanded movements of the trim?	└─┴─┴─┘	____________
B. Failure of the trim system to operate?	└─┴─┴─┘	____________
C. Failure of the landing gear to extend or retract? ...	└─┴─┴─┘	____________
D. Tail rotor failure?	└─┴─┴─┘	____________
E. Failure of the hydraulic system?	└─┴─┴─┘	____________
F. Valid transmission warning of potential failure?	└─┴─┴─┘	____________

G. Did you experience a malfunction or failure of any other aircraft device or system during the last 60 days?

YES 1
NO ....(SKIP TO GER3) 0
RF ....(SKIP TO GER3) 7
DK ....(SKIP TO GER3) 8
NA ....(SKIP TO GER3) 9

1. ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13. Which (airplane/helicopter) experienced this equipment problem (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: ______________

2. Which device or system malfunctioned or failed (most recently)?

SPECIFY: ______________________________

GER3. How many times during the last 60 days did an inflight (airplane/helicopter) on which you were a pilot or copilot experience smoke, fire, or fumes that originated in (READ QUESTIONS)?

	# EXPERIENCES (IF 0, SKIP TO NEXT)	**COL. 1.** **ASK ONLY IF MORE THAN ONE MAKE/ MODEL IN A13.** Which (airplane/ helicopter) (most recently) experienced smoke, fire, or fumes in (ER3 A-E)? Was it (READ A13 MAKE/ MODEL LIST)? **RECORD MAKE/MODEL 3 FROM A13.**	**COL. 2.** (Of the [# ER3 A-E] times there was smoke, fire, or fumes in the (ER3 A-E), how many involved/Did the smoke, fire, or fumes involve) electrical components or wiring?
A. the engine, engine compartment or nacelle (nuh-**SELL**)?	☐☐☐	________	☐☐☐
B. the cockpit?	☐☐☐	________	☐☐☐
C. the cargo or baggage area?	☐☐☐	________	☐☐☐
D. the passenger compartment area?	☐☐☐	________	☐☐☐
E. some place other than in the engine or nacelle (nuh-**SELL**), cockpit, cargo area, or passenger area?	☐☐☐	________	▨

1. SPECIFY WHERE: ____________________

GER4. During the last 60 days, how many times did an inflight (airplane/helicopter) on which you were a pilot or copilot experience a precautionary engine shutdown?

PRECAUTIONARY ENGINE SHUTDOWNS ☐☐☐
IF 0, SKIP TO GER5.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/helicopter) experienced a precautionary engine shutdown (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: ____________

GER5. During the last 60 days, how many times did an inflight (airplane/helicopter) on which you were a pilot or copilot experience a total engine failure?

TOTAL ENGINE FAILURE ☐☐☐

IF 0, SKIP TO GER6.

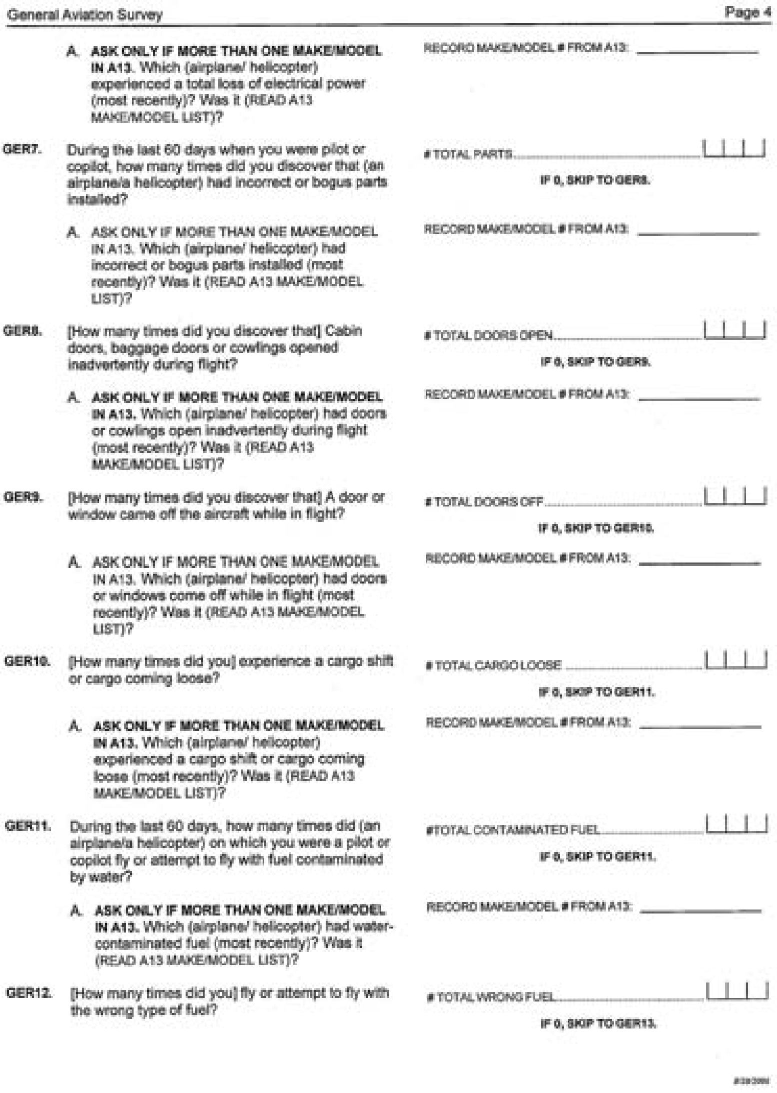
A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) experienced a total engine failure (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: ____________

GER6. During the last 60 days, how many times did an inflight (airplane/helicopter) on which you were a pilot or copilot experience total loss of electrical power?

TOTAL ELECTRICAL FAILURE ☐☐☐

IF 0, SKIP TO GER7.



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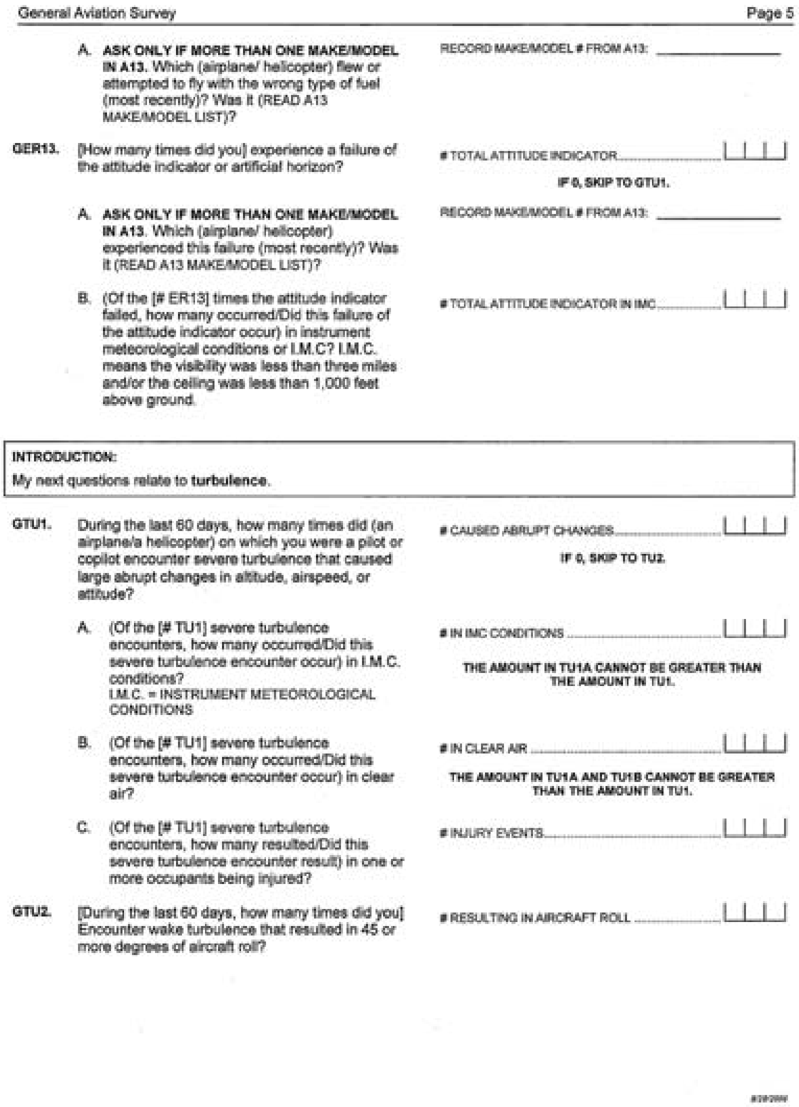
	A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) experienced a total loss of electrical power (most recently)? Was it (READ A13 MAKE/MODEL LIST)?	RECORD MAKE/MODEL # FROM A13: ______
GER7.	During the last 60 days when you were pilot or copilot, how many times did you discover that (an airplane/a helicopter) had incorrect or bogus parts installed?	# TOTAL PARTS .... ☐☐☐ **IF 0, SKIP TO GER8.**
	A. ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13. Which (airplane/ helicopter) had incorrect or bogus parts installed (most recently)? Was it (READ A13 MAKE/MODEL LIST)?	RECORD MAKE/MODEL # FROM A13: ______
GER8.	[How many times did you discover that] Cabin doors, baggage doors or cowlings opened inadvertently during flight?	# TOTAL DOORS OPEN .... ☐☐☐ **IF 0, SKIP TO GER9.**
	A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) had doors or cowlings open inadvertently during flight (most recently)? Was it (READ A13 MAKE/MODEL LIST)?	RECORD MAKE/MODEL # FROM A13: ______
GER9.	[How many times did you discover that] A door or window came off the aircraft while in flight?	# TOTAL DOORS OFF .... ☐☐☐ **IF 0, SKIP TO GER10.**
	A. ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13. Which (airplane/ helicopter) had doors or windows come off while in flight (most recently)? Was it (READ A13 MAKE/MODEL LIST)?	RECORD MAKE/MODEL # FROM A13: ______
GER10.	[How many times did you] experience a cargo shift or cargo coming loose?	# TOTAL CARGO LOOSE .... ☐☐☐ **IF 0, SKIP TO GER11.**
	A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) experienced a cargo shift or cargo coming loose (most recently)? Was it (READ A13 MAKE/MODEL LIST)?	RECORD MAKE/MODEL # FROM A13: ______
GER11.	During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot fly or attempt to fly with fuel contaminated by water?	#TOTAL CONTAMINATED FUEL .... ☐☐☐ **IF 0, SKIP TO GER11.**
	A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) had water-contaminated fuel (most recently)? Was it (READ A13 MAKE/MODEL LIST)?	RECORD MAKE/MODEL # FROM A13: ______
GER12.	[How many times did you] fly or attempt to fly with the wrong type of fuel?	# TOTAL WRONG FUEL .... ☐☐☐ **IF 0, SKIP TO GER13.**

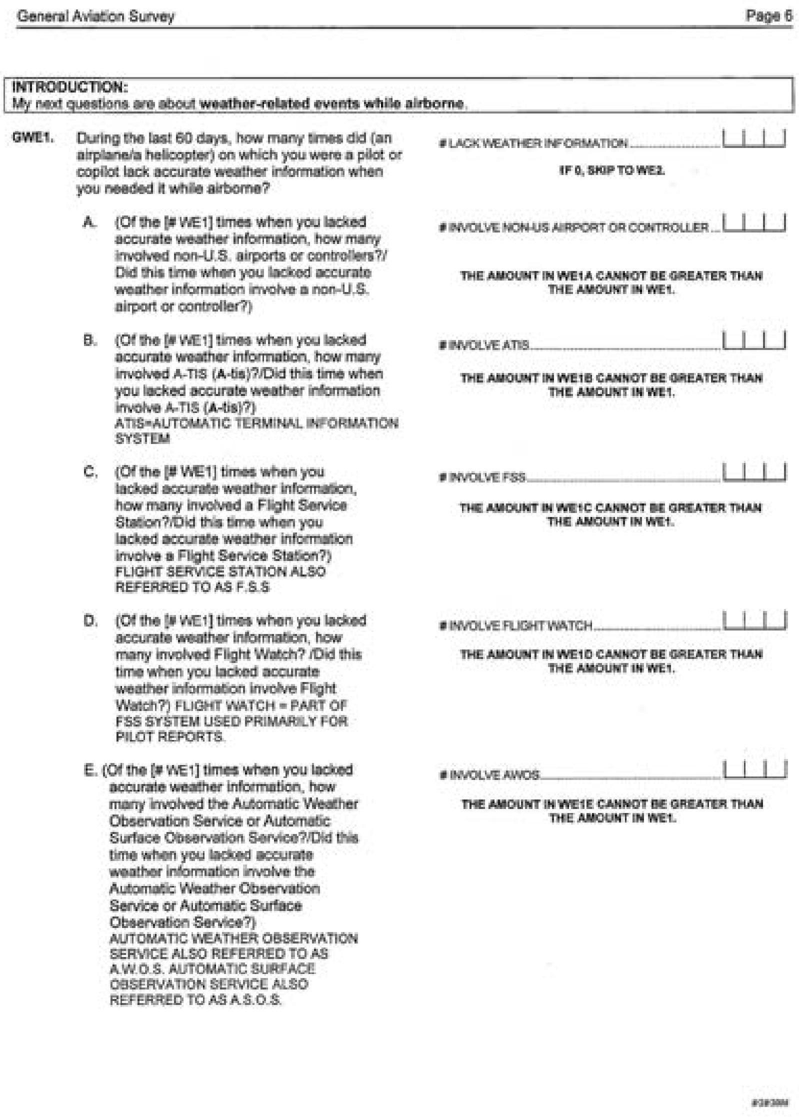


	A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) flew or attempted to fly with the wrong type of fuel (most recently)? Was it (READ A13 MAKE/MODEL LIST)?	RECORD MAKE/MODEL # FROM A13: ________
GER13.	[How many times did you] experience a failure of the attitude indicator or artificial horizon?	# TOTAL ATTITUDE INDICATOR .... |__|__|__| **IF 0, SKIP TO GTU1.**
	A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13**. Which (airplane/ helicopter) experienced this failure (most recently)? Was it (READ A13 MAKE/MODEL LIST)?	RECORD MAKE/MODEL # FROM A13: ________
	B. (Of the [# ER13] times the attitude indicator failed, how many occurred/Did this failure of the attitude indicator occur) in instrument meteorological conditions or I.M.C? I.M.C. means the visibility was less than three miles and/or the ceiling was less than 1,000 feet above ground.	# TOTAL ATTITUDE INDICATOR IN IMC .... |__|__|__|

INTRODUCTION:

My next questions relate to **turbulence**.

GTU1.	During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot encounter severe turbulence that caused large abrupt changes in altitude, airspeed, or attitude?	# CAUSED ABRUPT CHANGES .... |__|__|__| **IF 0, SKIP TO TU2.**
	A. (Of the [# TU1] severe turbulence encounters, how many occurred/Did this severe turbulence encounter occur) in I.M.C. conditions? I.M.C. = INSTRUMENT METEOROLOGICAL CONDITIONS	# IN IMC CONDITIONS .... |__|__|__| **THE AMOUNT IN TU1A CANNOT BE GREATER THAN THE AMOUNT IN TU1.**
	B. (Of the [# TU1] severe turbulence encounters, how many occurred/Did this severe turbulence encounter occur) in clear air?	# IN CLEAR AIR .... |__|__|__| **THE AMOUNT IN TU1A AND TU1B CANNOT BE GREATER THAN THE AMOUNT IN TU1.**
	C. (Of the [# TU1] severe turbulence encounters, how many resulted/Did this severe turbulence encounter result) in one or more occupants being injured?	# INJURY EVENTS .... |__|__|__|
GTU2.	[During the last 60 days, how many times did you] Encounter wake turbulence that resulted in 45 or more degrees of aircraft roll?	# RESULTING IN AIRCRAFT ROLL .... |__|__|__|



INTRODUCTION:
My next questions are about **weather-related events while airborne**.

GWE1.	During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot lack accurate weather information when you needed it while airborne?	# LACK WEATHER INFORMATION .... ☐☐☐ **IF 0, SKIP TO WE2.**
	A. (Of the [# WE1] times when you lacked accurate weather information, how many involved non-U.S. airports or controllers?/ Did this time when you lacked accurate weather information involve a non-U.S. airport or controller?)	# INVOLVE NON-US AIRPORT OR CONTROLLER ... ☐☐☐ **THE AMOUNT IN WE1A CANNOT BE GREATER THAN THE AMOUNT IN WE1.**
	B. (Of the [# WE1] times when you lacked accurate weather information, how many involved A-TIS (**A**-tis)?/Did this time when you lacked accurate weather information involve A-TIS (**A**-tis)?) ATIS=AUTOMATIC TERMINAL INFORMATION SYSTEM	# INVOLVE ATIS .... ☐☐☐ **THE AMOUNT IN WE1B CANNOT BE GREATER THAN THE AMOUNT IN WE1.**
	C. (Of the [# WE1] times when you lacked accurate weather information, how many involved a Flight Service Station?/Did this time when you lacked accurate weather information involve a Flight Service Station?) FLIGHT SERVICE STATION ALSO REFERRED TO AS F.S.S	# INVOLVE FSS .... ☐☐☐ **THE AMOUNT IN WE1C CANNOT BE GREATER THAN THE AMOUNT IN WE1.**
	D. (Of the [# WE1] times when you lacked accurate weather information, how many involved Flight Watch? /Did this time when you lacked accurate weather information involve Flight Watch?) FLIGHT WATCH = PART OF FSS SYSTEM USED PRIMARILY FOR PILOT REPORTS.	# INVOLVE FLIGHT WATCH .... ☐☐☐ **THE AMOUNT IN WE1D CANNOT BE GREATER THAN THE AMOUNT IN WE1.**
	E. (Of the [# WE1] times when you lacked accurate weather information, how many involved the Automatic Weather Observation Service or Automatic Surface Observation Service?/Did this time when you lacked accurate weather information involve the Automatic Weather Observation Service or Automatic Surface Observation Service?) AUTOMATIC WEATHER OBSERVATION SERVICE ALSO REFERRED TO AS A.W.O.S. AUTOMATIC SURFACE OBSERVATION SERVICE ALSO REFERRED TO AS A.S.O.S.	# INVOLVE AWOS .... ☐☐☐ **THE AMOUNT IN WE1E CANNOT BE GREATER THAN THE AMOUNT IN WE1.**

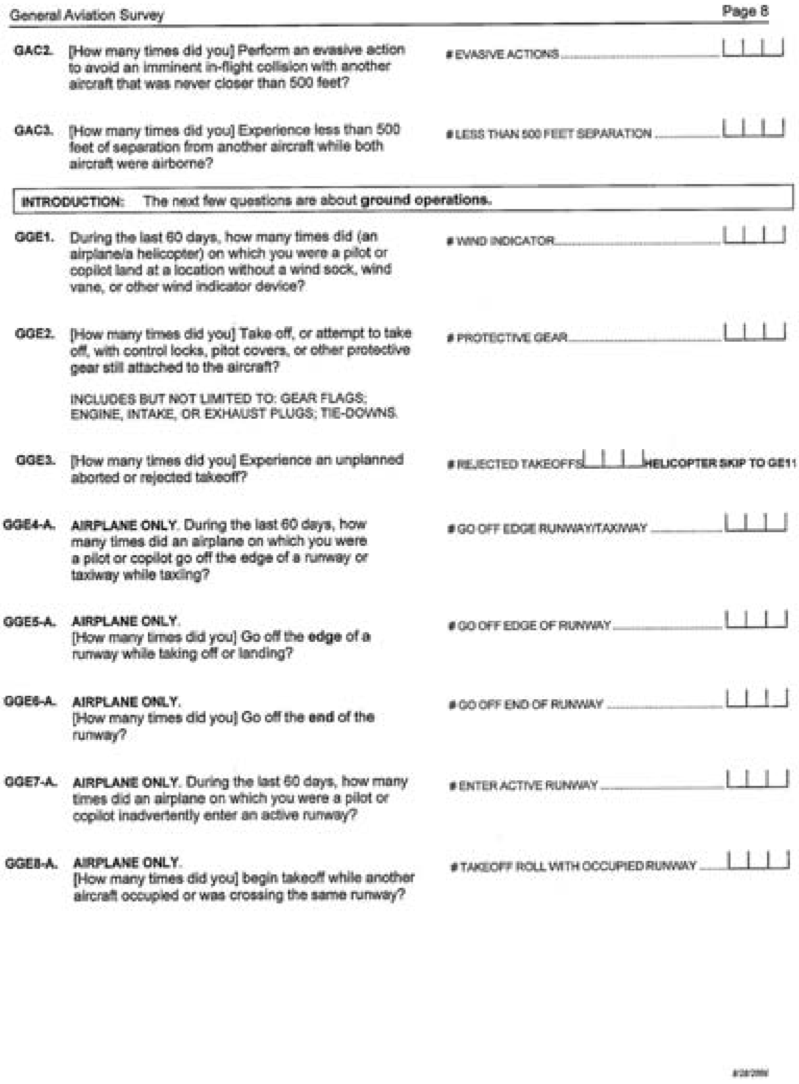
GWE2-A.	**AIRPLANE ONLY.** [How many times did you] divert to an alternate airfield because of weather?	# DIVERT TO ALTERNATE AIRFIELD .... ☐☐☐ **AIRPLANE GO TO WE3-A.**
GWE2-H	**HELICOPTER ONLY.** [How many times did you] divert to an alternate airfield, heliport or land because of weather?	# DIVERT TO ALTERNATE AIRFIELD .... ☐☐☐ **HELICOPTER GO TO WE3-H.**
GWE3-A	**AIRPLANE ONLY.** [How many times did you] experience airframe icing that reduced the aircraft's ability to maintain altitude, speed, stability, or directional control?	# EXPERIENCE AIRFRAME ICING .... ☐☐☐
GWE3-H	**HELICOPTER ONLY.** [How many times did you] experience airframe or rotor icing that reduced the aircraft's ability to maintain altitude, speed, stability, or directional control?	# EXPERIENCE AIRFRAME ICING .... ☐☐☐ **AIRPLANE GO TO WE4**
GWE4.	During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot encounter windshear or a microburst conditions that resulted in an airspeed deviation of 15 knots or greater?	# ENCOUNTER WINDSHEAR/MICROBURST .... ☐☐☐ **AIRCRAFT SKIP TO CP1. HELICOPTER CONTINUE.**
GWE5-H	**HELICOPTER ONLY.** [How many times did you] experience loss of tail rotor effectiveness due to high density altitude?	# ROTOR EFFECTIVENESS ALT .... ☐☐☐
GWE6-H	**HELICOPTER ONLY.** [How many times did you] experience loss of tail rotor effectiveness due to high winds?	# ROTOR EFFECTIVENESS WINDS .... ☐☐☐
GWE7-H	**HELICOPTER ONLY.** [How many times did you] experience loss of the visible horizon due to white out or brown out conditions on either takeoff or landing?	# IN BROWN OUT CONDITIONS .... ☐☐☐

INTRODUCTION:
My next question is about **passenger-related events.**

GCP1.	During the last 60 days, how many times were you distracted by a passenger while in flight, through conversation or physical contact? INCLUDES TAPPING ON SHOULDER.	# PAX DISTRACT .... ☐☐☐

INTRODUCTION: My next questions are about **airborne conflicts.** Just as a reminder, we are only asking about events that you experienced flying during the last 60 days under FAR (Part 135/Part 91/Part 135 and Part 91) as (an airplane/a helicopter) pilot or copilot.

GAC1.	How many times did you experience a bird strike?	# BIRD STRIKES .... ☐☐☐



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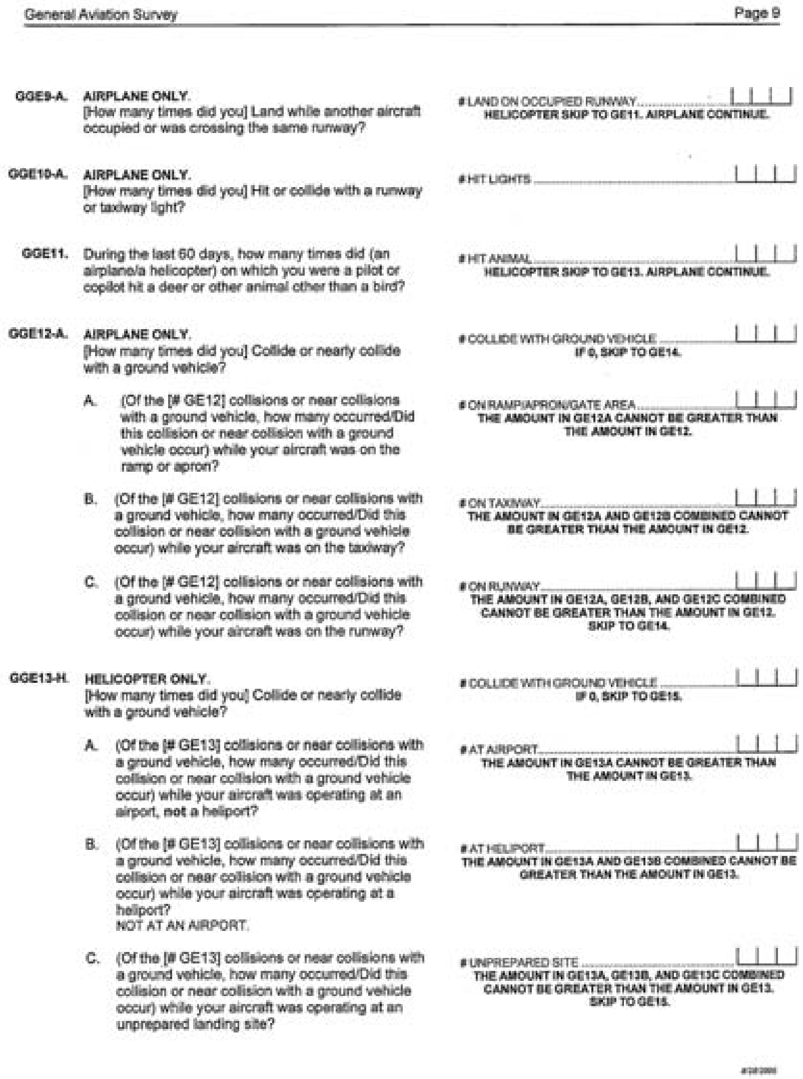
GAC2.	[How many times did you] Perform an evasive action to avoid an imminent in-flight collision with another aircraft that was never closer than 500 feet?	# EVASIVE ACTIONS .... |__|__|__|
GAC3.	[How many times did you] Experience less than 500 feet of separation from another aircraft while both aircraft were airborne?	# LESS THAN 500 FEET SEPARATION .... |__|__|__|

INTRODUCTION: The next few questions are about **ground operations.**

GGE1.	During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot land at a location without a wind sock, wind vane, or other wind indicator device?	# WIND INDICATOR .... |__|__|__|
GGE2.	[How many times did you] Take off, or attempt to take off, with control locks, pitot covers, or other protective gear still attached to the aircraft? INCLUDES BUT NOT LIMITED TO: GEAR FLAGS; ENGINE, INTAKE, OR EXHAUST PLUGS; TIE-DOWNS.	# PROTECTIVE GEAR .... |__|__|__|
GGE3.	[How many times did you] Experience an unplanned aborted or rejected takeoff?	# REJECTED TAKEOFFS |__|__|__| **HELICOPTER SKIP TO GE11**
GGE4-A.	**AIRPLANE ONLY.** During the last 60 days, how many times did an airplane on which you were a pilot or copilot go off the edge of a runway or taxiway while taxiing?	# GO OFF EDGE RUNWAY/TAXIWAY .... |__|__|__|
GGE5-A.	**AIRPLANE ONLY.** [How many times did you] Go off the **edge** of a runway while taking off or landing?	# GO OFF EDGE OF RUNWAY .... |__|__|__|
GGE6-A.	**AIRPLANE ONLY.** [How many times did you] Go off the **end** of the runway?	# GO OFF END OF RUNWAY .... |__|__|__|
GGE7-A.	**AIRPLANE ONLY.** During the last 60 days, how many times did an airplane on which you were a pilot or copilot inadvertently enter an active runway?	# ENTER ACTIVE RUNWAY .... |__|__|__|
GGE8-A.	**AIRPLANE ONLY.** [How many times did you] begin takeoff while another aircraft occupied or was crossing the same runway?	# TAKEOFF ROLL WITH OCCUPIED RUNWAY .... |__|__|__|



GGE9-A.	**AIRPLANE ONLY.** [How many times did you] Land while another aircraft occupied or was crossing the same runway?	# LAND ON OCCUPIED RUNWAY .... └─┴─┴─┘ **HELICOPTER SKIP TO GE11. AIRPLANE CONTINUE.**
GGE10-A.	**AIRPLANE ONLY.** [How many times did you] Hit or collide with a runway or taxiway light?	# HIT LIGHTS .... └─┴─┴─┘
GGE11.	During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot hit a deer or other animal other than a bird?	# HIT ANIMAL .... └─┴─┴─┘ **HELICOPTER SKIP TO GE13. AIRPLANE CONTINUE.**
GGE12-A.	**AIRPLANE ONLY.** [How many times did you] Collide or nearly collide with a ground vehicle?	# COLLIDE WITH GROUND VEHICLE .... └─┴─┴─┘ **IF 0, SKIP TO GE14.**
	A. (Of the [# GE12] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was on the ramp or apron?	# ON RAMP/APRON/GATE AREA .... └─┴─┴─┘ **THE AMOUNT IN GE12A CANNOT BE GREATER THAN THE AMOUNT IN GE12.**
	B. (Of the [# GE12] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was on the taxiway?	# ON TAXIWAY .... └─┴─┴─┘ **THE AMOUNT IN GE12A AND GE12B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE12.**
	C. (Of the [# GE12] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was on the runway?	# ON RUNWAY .... └─┴─┴─┘ **THE AMOUNT IN GE12A, GE12B, AND GE12C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE12. SKIP TO GE14.**
GGE13-H.	**HELICOPTER ONLY.** [How many times did you] Collide or nearly collide with a ground vehicle?	# COLLIDE WITH GROUND VEHICLE .... └─┴─┴─┘ **IF 0, SKIP TO GE15.**
	A. (Of the [# GE13] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was operating at an airport, **not** a heliport?	# AT AIRPORT .... └─┴─┴─┘ **THE AMOUNT IN GE13A CANNOT BE GREATER THAN THE AMOUNT IN GE13.**
	B. (Of the [# GE13] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was operating at a heliport? NOT AT AN AIRPORT.	# AT HELIPORT .... └─┴─┴─┘ **THE AMOUNT IN GE13A AND GE13B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE13.**
	C. (Of the [# GE13] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was operating at an unprepared landing site?	# UNPREPARED SITE .... └─┴─┴─┘ **THE AMOUNT IN GE13A, GE13B, AND GE13C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE13. SKIP TO GE15.**

GGE14-A. **AIRPLANE ONLY.**
During the last 60 days, how many times did an airplane on which you were a pilot or copilot nearly experience a ground collision with another aircraft while both aircraft were on the ground?

NEAR GROUND COLLISION .... └┴┴┘
IF 0, SKIP TO GE15.

A. (Of the [# GE14] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the ramp or apron?

ON RAMP/APRON/GATE AREA .... └┴┴┘
THE AMOUNT IN GE14A CANNOT BE GREATER THAN THE AMOUNT IN GE14.

B. (Of the [# GE14] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the taxiway?

ON TAXIWAY .... └┴┴┘
THE AMOUNT IN GE14A AND GE14B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE14.

C. (Of the [# GE14] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the runway?

ON RUNWAY .... └┴┴┘
THE AMOUNT IN GE14A, GE14B, AND GE14C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE14.

GGE15. During the last 60 days, how many times did you experience a collision or near collision with anything other than an animal, a ground vehicle, or another aircraft while on the ground?

OTHER GROUND COLLISION .... └┴┴┘
IF 0, SKIP TO AH1.

A. What were the objects you collided with or nearly collided with? SPECIFY.

SPECIFY: ______________________________

INTRODUCTION: My next questions are about **aircraft handling-related events.**

GAH1. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or co-pilot use some of its reserve fuel as defined by the FAR?

USE RESERVE FUEL .... └┴┴┘

GAH2. [How many times did you] Accept an A.T.C. clearance that the (airplane/helicopter) could not comply with because of its performance limits?

ACCEPT CLEARANCE NOT COMPLY WITH .... └┴┴┘

GAH3. [How many times did you] Lose sight of another aircraft from which the pilot or copilot was trying to maintain visual separation?

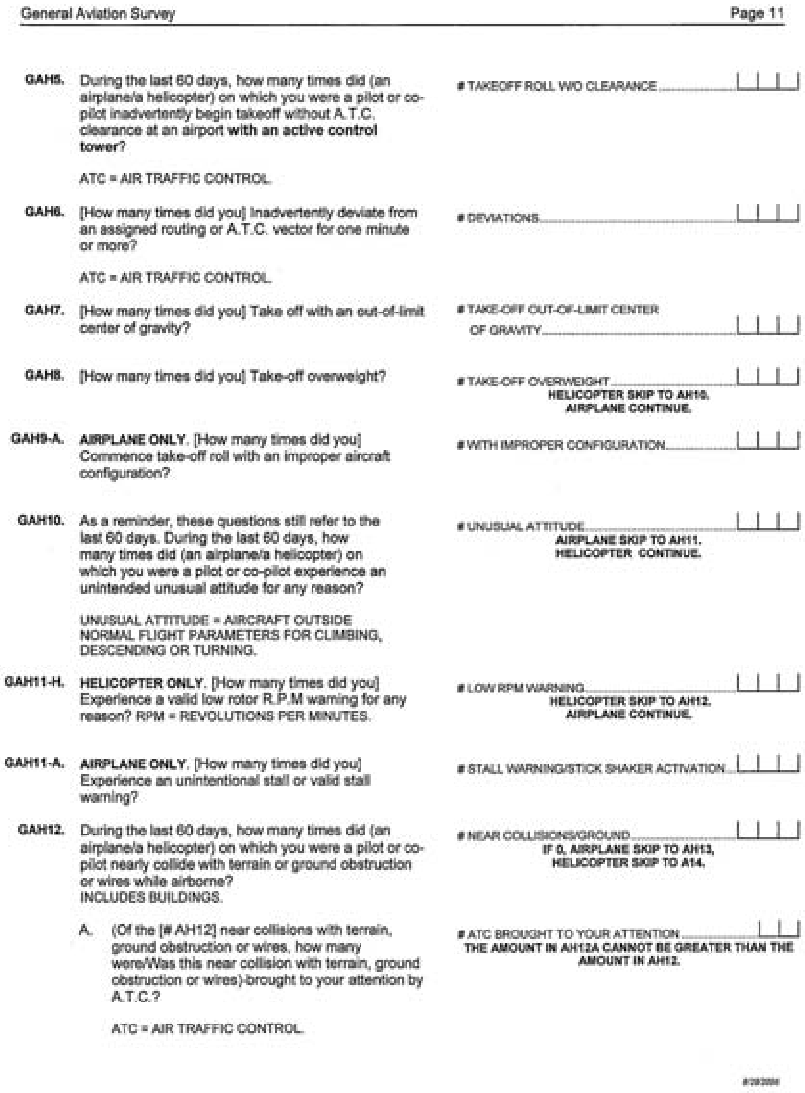
LOSE SIGHT OF AIRCRAFT .... └┴┴┘
IF 0, SKIP TO AH4.

A. (Of the [# AH3] times your aircraft lost sight of another aircraft, how many occurred/Did losing sight of another aircraft occur) in marginal visual conditions of 3 miles or less?

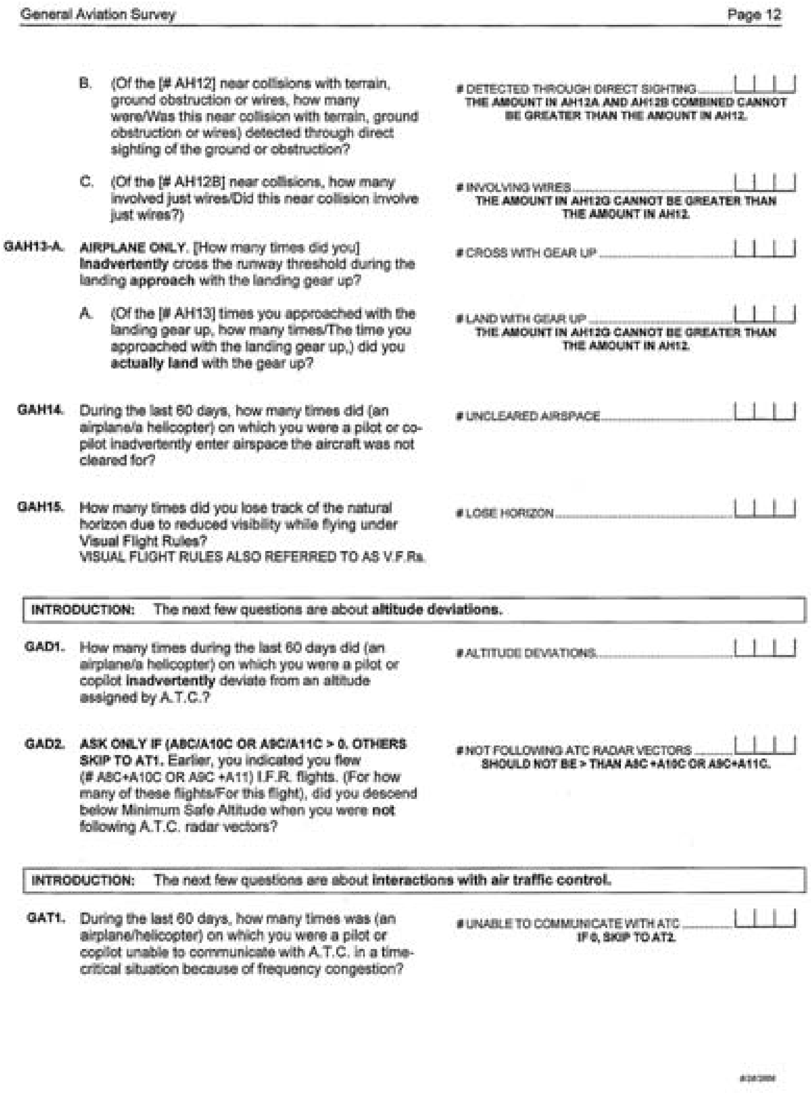
IN MARGINAL VISUAL CONDITIONS .... └┴┴┘
THE AMOUNT IN AH3A CANNOT BE GREATER THAN THE AMOUNT IN AH3.

GAH4. [How many times did you] **Inadvertently** land without clearance at an airport with an **active control tower?**

LAND W/O CLEARANCE .... └┴┴┘



GAH5.	During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or co-pilot inadvertently begin takeoff without A.T.C. clearance at an airport **with an active control tower**? ATC = AIR TRAFFIC CONTROL.	# TAKEOFF ROLL W/O CLEARANCE ....
GAH6.	[How many times did you] Inadvertently deviate from an assigned routing or A.T.C. vector for one minute or more? ATC = AIR TRAFFIC CONTROL.	# DEVIATIONS ....
GAH7.	[How many times did you] Take off with an out-of-limit center of gravity?	# TAKE-OFF OUT-OF-LIMIT CENTER OF GRAVITY ....
GAH8.	[How many times did you] Take-off overweight?	# TAKE-OFF OVERWEIGHT .... **HELICOPTER SKIP TO AH10.** **AIRPLANE CONTINUE.**
GAH9-A.	**AIRPLANE ONLY**. [How many times did you] Commence take-off roll with an improper aircraft configuration?	# WITH IMPROPER CONFIGURATION ....
GAH10.	As a reminder, these questions still refer to the last 60 days. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or co-pilot experience an unintended unusual attitude for any reason? UNUSUAL ATTITUDE = AIRCRAFT OUTSIDE NORMAL FLIGHT PARAMETERS FOR CLIMBING, DESCENDING OR TURNING.	# UNUSUAL ATTITUDE .... **AIRPLANE SKIP TO AH11.** **HELICOPTER CONTINUE.**
GAH11-H.	**HELICOPTER ONLY**. [How many times did you] Experience a valid low rotor R.P.M warning for any reason? RPM = REVOLUTIONS PER MINUTES.	# LOW RPM WARNING .... **HELICOPTER SKIP TO AH12.** **AIRPLANE CONTINUE.**
GAH11-A.	**AIRPLANE ONLY**. [How many times did you] Experience an unintentional stall or valid stall warning?	# STALL WARNING/STICK SHAKER ACTIVATION ....
GAH12.	During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or co-pilot nearly collide with terrain or ground obstruction or wires while airborne? INCLUDES BUILDINGS.	# NEAR COLLISIONS/GROUND .... **IF 0, AIRPLANE SKIP TO AH13,** **HELICOPTER SKIP TO A14.**
	A. (Of the [# AH12] near collisions with terrain, ground obstruction or wires, how many were/Was this near collision with terrain, ground obstruction or wires)-brought to your attention by A.T.C.? ATC = AIR TRAFFIC CONTROL.	# ATC BROUGHT TO YOUR ATTENTION .... **THE AMOUNT IN AH12A CANNOT BE GREATER THAN THE AMOUNT IN AH12.**



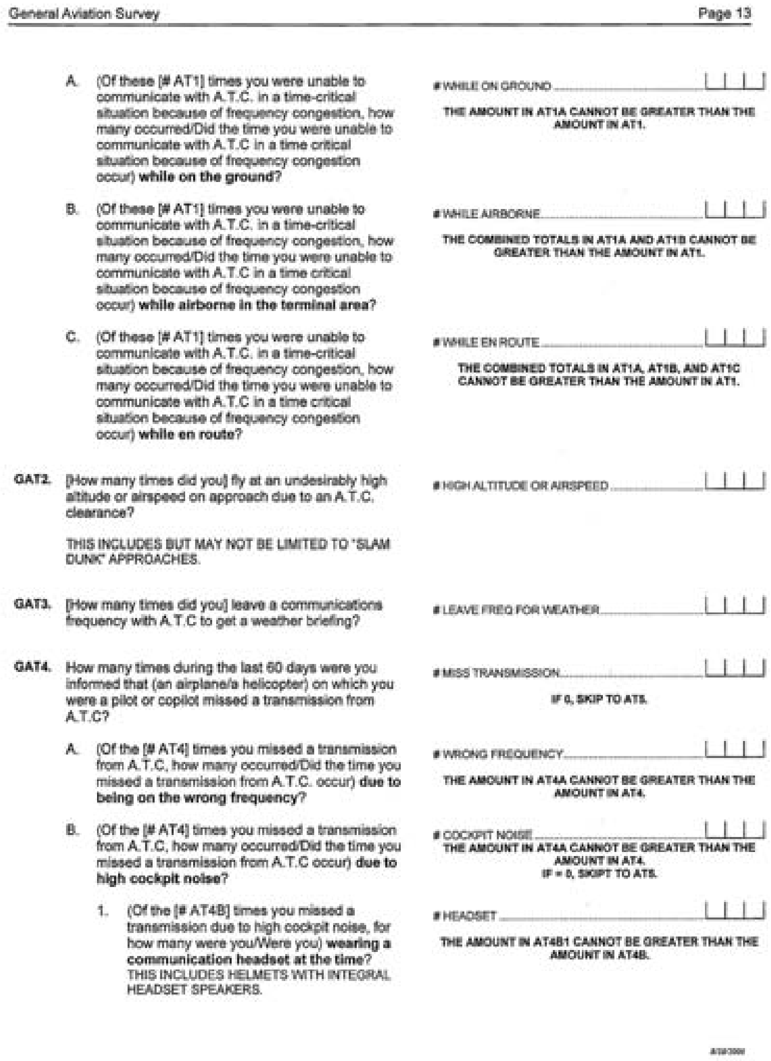
	B. (Of the [# AH12] near collisions with terrain, ground obstruction or wires, how many were/Was this near collision with terrain, ground obstruction or wires) detected through direct sighting of the ground or obstruction?	# DETECTED THROUGH DIRECT SIGHTING ☐☐☐ **THE AMOUNT IN AH12A AND AH12B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN AH12.**
	C. (Of the [# AH12B] near collisions, how many involved just wires/Did this near collision involve just wires?)	# INVOLVING WIRES ☐☐☐ **THE AMOUNT IN AH12G CANNOT BE GREATER THAN THE AMOUNT IN AH12.**
GAH13-A.	**AIRPLANE ONLY.** [How many times did you] **inadvertently** cross the runway threshold during the landing **approach** with the landing gear up?	# CROSS WITH GEAR UP ☐☐☐
	A. (Of the [# AH13] times you approached with the landing gear up, how many times/The time you approached with the landing gear up,) did you **actually land** with the gear up?	# LAND WITH GEAR UP ☐☐☐ **THE AMOUNT IN AH12G CANNOT BE GREATER THAN THE AMOUNT IN AH12.**
GAH14.	During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or co-pilot inadvertently enter airspace the aircraft was not cleared for?	# UNCLEARED AIRSPACE ☐☐☐
GAH15.	How many times did you lose track of the natural horizon due to reduced visibility while flying under Visual Flight Rules? VISUAL FLIGHT RULES ALSO REFERRED TO AS V.F.Rs.	# LOSE HORIZON ☐☐☐

INTRODUCTION: The next few questions are about **altitude deviations.**

GAD1.	How many times during the last 60 days did (an airplane/a helicopter) on which you were a pilot or copilot **inadvertently** deviate from an altitude assigned by A.T.C.?	# ALTITUDE DEVIATIONS ☐☐☐
GAD2.	**ASK ONLY IF (A8C/A10C OR A9C/A11C > 0. OTHERS SKIP TO AT1.** Earlier, you indicated you flew (# A8C+A10C OR A9C +A11) I.F.R. flights. (For how many of these flights/For this flight), did you descend below Minimum Safe Altitude when you were **not** following A.T.C. radar vectors?	# NOT FOLLOWING ATC RADAR VECTORS ☐☐☐ **SHOULD NOT BE > THAN A8C +A10C OR A9C+A11C.**

INTRODUCTION: The next few questions are about **interactions with air traffic control.**

GAT1.	During the last 60 days, how many times was (an airplane/helicopter) on which you were a pilot or copilot unable to communicate with A.T.C. in a time-critical situation because of frequency congestion?	# UNABLE TO COMMUNICATE WITH ATC ☐☐☐ **IF 0, SKIP TO AT2.**



A. (Of these [# AT1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A.T.C in a time critical situation because of frequency congestion occur) **while on the ground?**

# WHILE ON GROUND .... |_|_|_|

THE AMOUNT IN AT1A CANNOT BE GREATER THAN THE AMOUNT IN AT1.

B. (Of these [# AT1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A.T.C in a time critical situation because of frequency congestion occur) **while airborne in the terminal area?**

# WHILE AIRBORNE .... |_|_|_|

THE COMBINED TOTALS IN AT1A AND AT1B CANNOT BE GREATER THAN THE AMOUNT IN AT1.

C. (Of these [# AT1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A.T.C in a time critical situation because of frequency congestion occur) **while en route?**

# WHILE EN ROUTE .... |_|_|_|

THE COMBINED TOTALS IN AT1A, AT1B, AND AT1C CANNOT BE GREATER THAN THE AMOUNT IN AT1.

GAT2. [How many times did you] fly at an undesirably high altitude or airspeed on approach due to an A.T.C. clearance?

THIS INCLUDES BUT MAY NOT BE LIMITED TO "SLAM DUNK" APPROACHES.

# HIGH ALTITUDE OR AIRSPEED .... |_|_|_|

GAT3. [How many times did you] leave a communications frequency with A.T.C to get a weather briefing?

# LEAVE FREQ FOR WEATHER .... |_|_|_|

GAT4. How many times during the last 60 days were you informed that (an airplane/a helicopter) on which you were a pilot or copilot missed a transmission from A.T.C?

# MISS TRANSMISSION .... |_|_|_|

IF 0, SKIP TO AT5.

A. (Of the [# AT4] times you missed a transmission from A.T.C, how many occurred/Did the time you missed a transmission from A.T.C. occur) **due to being on the wrong frequency?**

# WRONG FREQUENCY .... |_|_|_|

THE AMOUNT IN AT4A CANNOT BE GREATER THAN THE AMOUNT IN AT4.

B. (Of the [# AT4] times you missed a transmission from A.T.C, how many occurred/Did the time you missed a transmission from A.T.C occur) **due to high cockpit noise?**

# COCKPIT NOISE .... |_|_|_|

THE AMOUNT IN AT4A CANNOT BE GREATER THAN THE AMOUNT IN AT4.
IF = 0, SKIPT TO AT5.

1. (Of the [# AT4B] times you missed a transmission due to high cockpit noise, for how many were you/Were you) **wearing a communication headset at the time?** THIS INCLUDES HELMETS WITH INTEGRAL HEADSET SPEAKERS.

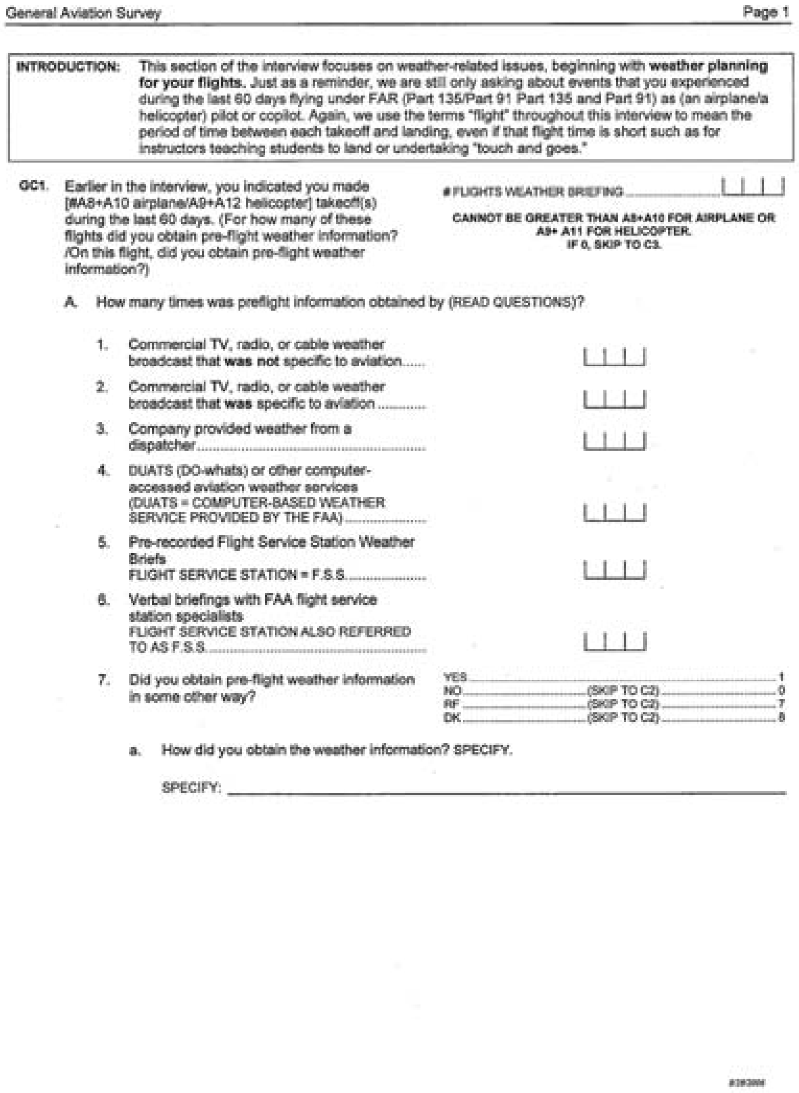
# HEADSET .... |_|_|_|

THE AMOUNT IN AT4B1 CANNOT BE GREATER THAN THE AMOUNT IN AT4B.

GAT5 How many times did you receive out of date, inaccurate or no information about relevant NOTAMs (**NO**-tams)?

NOTAMS = NOTICES TO AIRMEN.

NOTAMS .... |__|__|__|



INTRODUCTION:	This section of the interview focuses on weather-related issues, beginning with **weather planning for your flights.** Just as a reminder, we are still only asking about events that you experienced during the last 60 days flying under FAR (Part 135/Part 91 Part 135 and Part 91) as (an airplane/a helicopter) pilot or copilot. Again, we use the terms "flight" throughout this interview to mean the period of time between each takeoff and landing, even if that flight time is short such as for instructors teaching students to land or undertaking "touch and goes."

GC1. Earlier in the interview, you indicated you made [#A8+A10 airplane/A9+A12 helicopter] takeoff(s) during the last 60 days. (For how many of these flights did you obtain pre-flight weather information? /On this flight, did you obtain pre-flight weather information?)

FLIGHTS WEATHER BRIEFING .... |___|___|___|

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+ A11 FOR HELICOPTER.
IF 0, SKIP TO C3.

A. How many times was preflight information obtained by (READ QUESTIONS)?

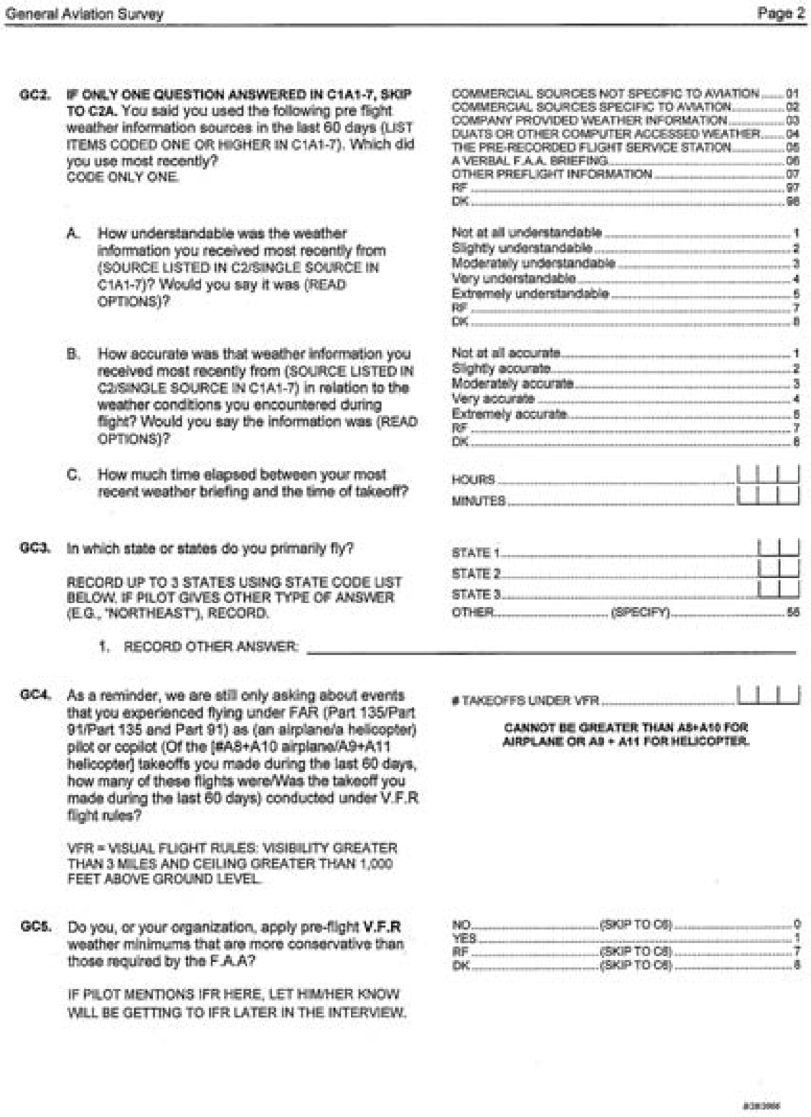
1.	Commercial TV, radio, or cable weather broadcast that **was not** specific to aviation......	|___|___|___|
2.	Commercial TV, radio, or cable weather broadcast that **was** specific to aviation	|___|___|___|
3.	Company provided weather from a dispatcher..	|___|___|___|
4.	DUATS (DO-whats) or other computer-accessed aviation weather services (DUATS = COMPUTER-BASED WEATHER SERVICE PROVIDED BY THE FAA)......................	|___|___|___|
5.	Pre-recorded Flight Service Station Weather Briefs FLIGHT SERVICE STATION = F.S.S....................	|___|___|___|
6.	Verbal briefings with FAA flight service station specialists FLIGHT SERVICE STATION ALSO REFERRED TO AS F.S.S..	|___|___|___|

7. Did you obtain pre-flight weather information in some other way?

YES		1
NO	(SKIP TO C2)	0
RF	(SKIP TO C2)	7
DK	(SKIP TO C2)	8

a. How did you obtain the weather information? SPECIFY.

SPECIFY: ____



General Aviation Survey Page 2

GC2. **IF ONLY ONE QUESTION ANSWERED IN C1A1-7, SKIP TO C2A.** You said you used the following pre flight weather information sources in the last 60 days (LIST ITEMS CODED ONE OR HIGHER IN C1A1-7). Which did you use most recently?
CODE ONLY ONE.

COMMERCIAL SOURCES NOT SPECIFIC TO AVIATION	01
COMMERCIAL SOURCES SPECIFIC TO AVIATION	02
COMPANY PROVIDED WEATHER INFORMATION	03
DUATS OR OTHER COMPUTER ACCESSED WEATHER	04
THE PRE-RECORDED FLIGHT SERVICE STATION	05
A VERBAL F.A.A. BRIEFING	06
OTHER PREFLIGHT INFORMATION	07
RF	97
DK	98

A. How understandable was the weather information you received most recently from (SOURCE LISTED IN C2/SINGLE SOURCE IN C1A1-7)? Would you say it was (READ OPTIONS)?

Not at all understandable	1
Slightly understandable	2
Moderately understandable	3
Very understandable	4
Extremely understandable	5
RF	7
DK	8

B. How accurate was that weather information you received most recently from (SOURCE LISTED IN C2/SINGLE SOURCE IN C1A1-7) in relation to the weather conditions you encountered during flight? Would you say the information was (READ OPTIONS)?

Not at all accurate	1
Slightly accurate	2
Moderately accurate	3
Very accurate	4
Extremely accurate	5
RF	7
DK	8

C. How much time elapsed between your most recent weather briefing and the time of takeoff?

HOURS ☐☐☐
MINUTES ☐☐☐

GC3. In which state or states do you primarily fly?

RECORD UP TO 3 STATES USING STATE CODE LIST BELOW. IF PILOT GIVES OTHER TYPE OF ANSWER (E.G., "NORTHEAST"), RECORD.

STATE 1 ☐☐
STATE 2 ☐☐
STATE 3 ☐☐
OTHER (SPECIFY) 55

1. RECORD OTHER ANSWER: ______

GC4. As a reminder, we are still only asking about events that you experienced flying under FAR (Part 135/Part 91/Part 135 and Part 91) as (an airplane/a helicopter) pilot or copilot (Of the [#A8+A10 airplane/A9+A11 helicopter] takeoffs you made during the last 60 days, how many of these flights were/Was the takeoff you made during the last 60 days) conducted under V.F.R flight rules?

VFR = VISUAL FLIGHT RULES: VISIBILITY GREATER THAN 3 MILES AND CEILING GREATER THAN 1,000 FEET ABOVE GROUND LEVEL.

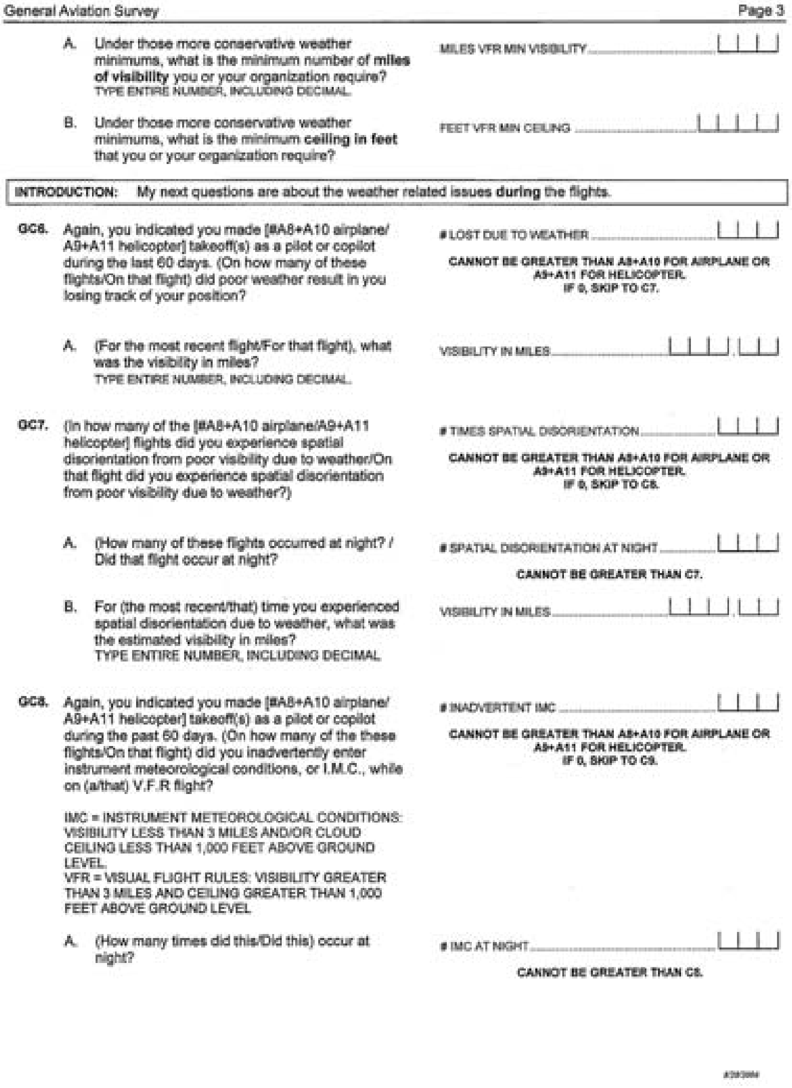
TAKEOFFS UNDER VFR ☐☐☐

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9 + A11 FOR HELICOPTER.

GC5. Do you, or your organization, apply pre-flight **V.F.R** weather minimums that are more conservative than those required by the F.A.A?

IF PILOT MENTIONS IFR HERE, LET HIM/HER KNOW WILL BE GETTING TO IFR LATER IN THE INTERVIEW.

NO	(SKIP TO C6)	0
YES		1
RF	(SKIP TO C6)	7
DK	(SKIP TO C6)	8

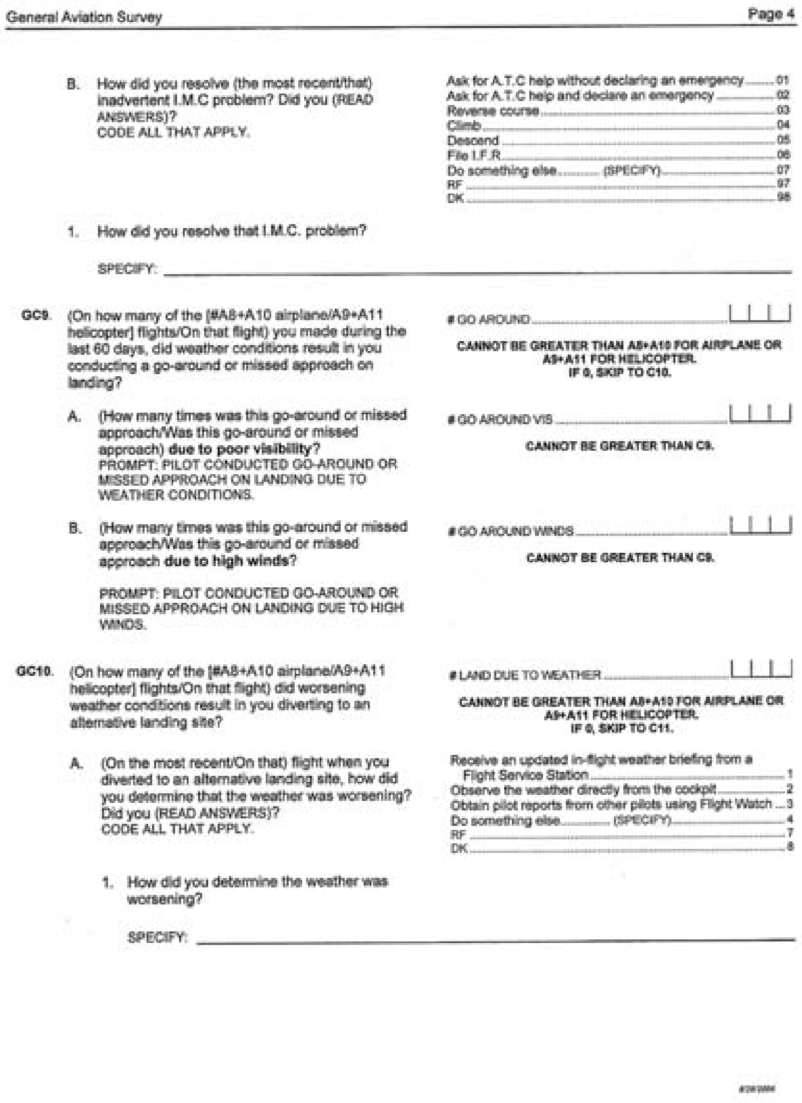


General Aviation Survey Page 3

	A.	Under those more conservative weather minimums, what is the minimum number of **miles of visibility** you or your organization require? TYPE ENTIRE NUMBER, INCLUDING DECIMAL.	MILES VFR MIN VISIBILITY
	B.	Under those more conservative weather minimums, what is the minimum **ceiling in feet** that you or your organization require?	FEET VFR MIN CEILING

INTRODUCTION: My next questions are about the weather related issues **during** the flights.

GC6.		Again, you indicated you made [#A8+A10 airplane/ A9+A11 helicopter] takeoff(s) as a pilot or copilot during the last 60 days. (On how many of these flights/On that flight) did poor weather result in you losing track of your position?	# LOST DUE TO WEATHER **CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER. IF 0, SKIP TO C7.**
	A.	(For the most recent flight/For that flight), what was the visibility in miles? TYPE ENTIRE NUMBER, INCLUDING DECIMAL.	VISIBILITY IN MILES
GC7.		(In how many of the [#A8+A10 airplane/A9+A11 helicopter] flights did you experience spatial disorientation from poor visibility due to weather/On that flight did you experience spatial disorientation from poor visibility due to weather?)	# TIMES SPATIAL DISORIENTATION **CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER. IF 0, SKIP TO C8.**
	A.	(How many of these flights occurred at night? / Did that flight occur at night?	# SPATIAL DISORIENTATION AT NIGHT **CANNOT BE GREATER THAN C7.**
	B.	For (the most recent/that) time you experienced spatial disorientation due to weather, what was the estimated visibility in miles? TYPE ENTIRE NUMBER, INCLUDING DECIMAL.	VISIBILITY IN MILES
GC8.		Again, you indicated you made [#A8+A10 airplane/ A9+A11 helicopter] takeoff(s) as a pilot or copilot during the past 60 days. (On how many of the these flights/On that flight) did you inadvertently enter instrument meteorological conditions, or I.M.C., while on (a/that) V.F.R flight? IMC = INSTRUMENT METEOROLOGICAL CONDITIONS: VISIBILITY LESS THAN 3 MILES AND/OR CLOUD CEILING LESS THAN 1,000 FEET ABOVE GROUND LEVEL. VFR = VISUAL FLIGHT RULES: VISIBILITY GREATER THAN 3 MILES AND CEILING GREATER THAN 1,000 FEET ABOVE GROUND LEVEL.	# INADVERTENT IMC **CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER. IF 0, SKIP TO C9.**
	A.	(How many times did this/Did this) occur at night?	# IMC AT NIGHT **CANNOT BE GREATER THAN C8.**



B. How did you resolve (the most recent/that) inadvertent I.M.C problem? Did you (READ ANSWERS)?
CODE ALL THAT APPLY.

Ask for A.T.C help without declaring an emergency	01
Ask for A.T.C help and declare an emergency	02
Reverse course	03
Climb	04
Descend	05
File I.F.R	06
Do something else .... (SPECIFY)	07
RF	97
DK	98

1. How did you resolve that I.M.C. problem?

SPECIFY: ____________________

GC9. (On how many of the [#A8+A10 airplane/A9+A11 helicopter] flights/On that flight) you made during the last 60 days, did weather conditions result in you conducting a go-around or missed approach on landing?

GO AROUND .... |_|_|_|

**CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER.
IF 0, SKIP TO C10.**

A. (How many times was this go-around or missed approach/Was this go-around or missed approach) **due to poor visibility?**
PROMPT: PILOT CONDUCTED GO-AROUND OR MISSED APPROACH ON LANDING DUE TO WEATHER CONDITIONS.

GO AROUND VIS .... |_|_|_|

CANNOT BE GREATER THAN C9.

B. (How many times was this go-around or missed approach/Was this go-around or missed approach **due to high winds?**

PROMPT: PILOT CONDUCTED GO-AROUND OR MISSED APPROACH ON LANDING DUE TO HIGH WINDS.

GO AROUND WINDS .... |_|_|_|

CANNOT BE GREATER THAN C9.

GC10. (On how many of the [#A8+A10 airplane/A9+A11 helicopter] flights/On that flight) did worsening weather conditions result in you diverting to an alternative landing site?

LAND DUE TO WEATHER .... |_|_|_|

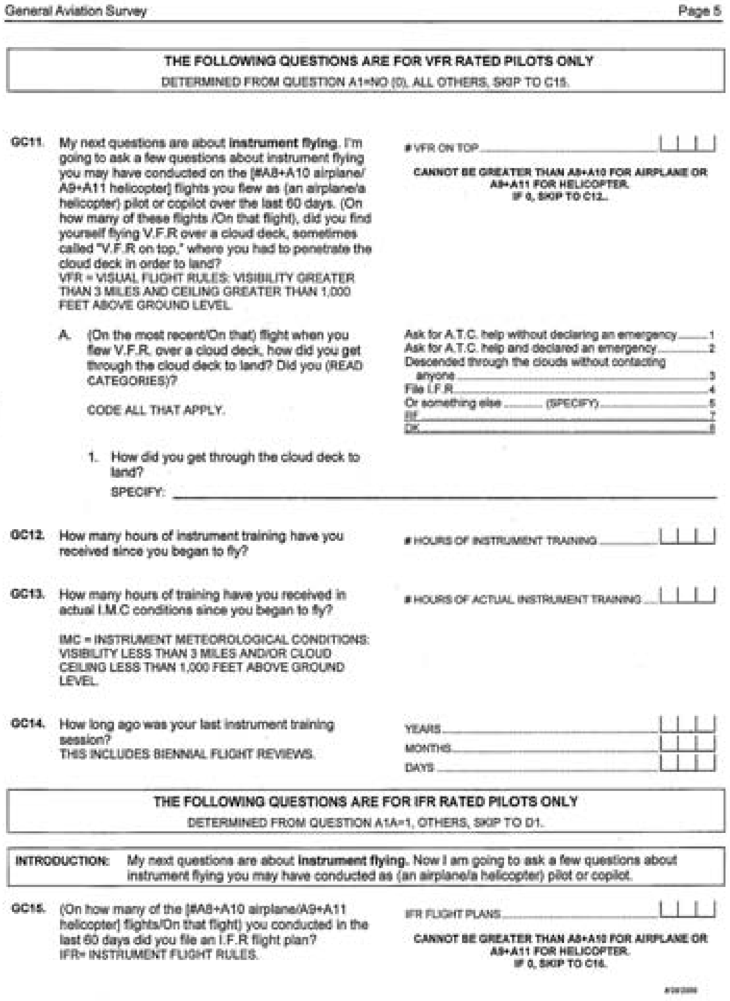
**CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER.
IF 0, SKIP TO C11.**

A. (On the most recent/On that) flight when you diverted to an alternative landing site, how did you determine that the weather was worsening? Did you (READ ANSWERS)?
CODE ALL THAT APPLY.

Receive an updated in-flight weather briefing from a Flight Service Station	1
Observe the weather directly from the cockpit	2
Obtain pilot reports from other pilots using Flight Watch	3
Do something else .... (SPECIFY)	4
RF	7
DK	8

1. How did you determine the weather was worsening?

SPECIFY: ____________________



THE FOLLOWING QUESTIONS ARE FOR VFR RATED PILOTS ONLY

DETERMINED FROM QUESTION A1=NO (0), ALL OTHERS, SKIP TO C15.

GC11. My next questions are about **instrument flying**. I'm going to ask a few questions about instrument flying you may have conducted on the [#A8+A10 airplane/ A9+A11 helicopter] flights you flew as (an airplane/a helicopter) pilot or copilot over the last 60 days. (On how many of these flights /On that flight), did you find yourself flying V.F.R over a cloud deck, sometimes called "V.F.R on top," where you had to penetrate the cloud deck in order to land?
VFR = VISUAL FLIGHT RULES: VISIBILITY GREATER THAN 3 MILES AND CEILING GREATER THAN 1,000 FEET ABOVE GROUND LEVEL.

VFR ON TOP ______ |_|_|_|

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER. IF 0, SKIP TO C12.

A. (On the most recent/On that) flight when you flew V.F.R. over a cloud deck, how did you get through the cloud deck to land? Did you (READ CATEGORIES)?

CODE ALL THAT APPLY.

Ask for A.T.C. help without declaring an emergency	1
Ask for A.T.C. help and declared an emergency	2
Descended through the clouds without contacting anyone	3
File I.F.R	4
Or something else ______ (SPECIFY)	5
RF	7
DK	8

1. How did you get through the cloud deck to land?
SPECIFY: ______________________________

GC12. How many hours of instrument training have you received since you began to fly?

HOURS OF INSTRUMENT TRAINING ______ |_|_|_|

GC13. How many hours of training have you received in actual I.M.C conditions since you began to fly?

IMC = INSTRUMENT METEOROLOGICAL CONDITIONS: VISIBILITY LESS THAN 3 MILES AND/OR CLOUD CEILING LESS THAN 1,000 FEET ABOVE GROUND LEVEL.

HOURS OF ACTUAL INSTRUMENT TRAINING ______ |_|_|_|

GC14. How long ago was your last instrument training session?
THIS INCLUDES BIENNIAL FLIGHT REVIEWS.

YEARS ______ |_|_|_|
MONTHS ______ |_|_|_|
DAYS ______ |_|_|_|

THE FOLLOWING QUESTIONS ARE FOR IFR RATED PILOTS ONLY

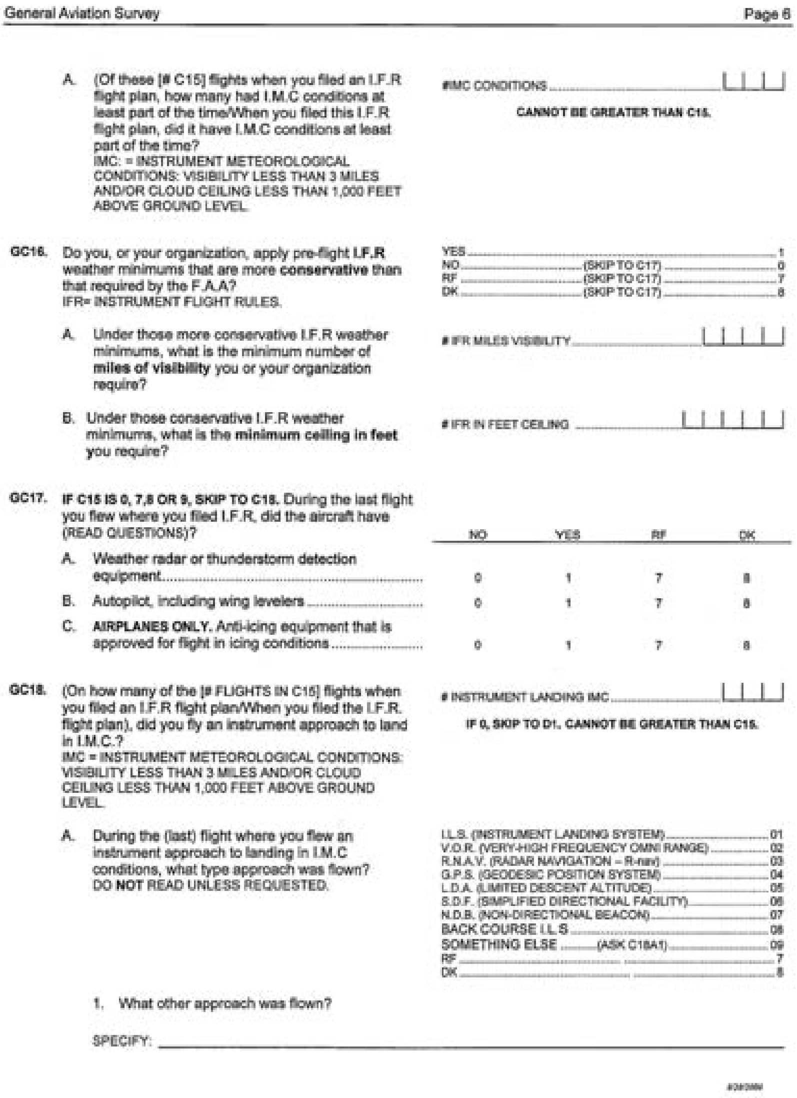
DETERMINED FROM QUESTION A1A=1, OTHERS, SKIP TO D1.

INTRODUCTION: My next questions are about **instrument flying.** Now I am going to ask a few questions about instrument flying you may have conducted as (an airplane/a helicopter) pilot or copilot.

GC15. (On how many of the [#A8+A10 airplane/A9+A11 helicopter] flights/On that flight) you conducted in the last 60 days did you file an I.F.R flight plan?
IFR= INSTRUMENT FLIGHT RULES.

IFR FLIGHT PLANS ______ |_|_|_|

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER. IF 0, SKIP TO C16.



A. (Of these [# C15] flights when you filed an I.F.R flight plan, how many had I.M.C conditions at least part of the time/When you filed this I.F.R flight plan, did it have I.M.C conditions at least part of the time?
IMC: = INSTRUMENT METEOROLOGICAL CONDITIONS: VISIBILITY LESS THAN 3 MILES AND/OR CLOUD CEILING LESS THAN 1,000 FEET ABOVE GROUND LEVEL.

#IMC CONDITIONS .... |__|__|__|

CANNOT BE GREATER THAN C15.

GC16. Do you, or your organization, apply pre-flight **I.F.R** weather minimums that are more **conservative** than that required by the F.A.A?
IFR= INSTRUMENT FLIGHT RULES.

YES 1
NO .... (SKIP TO C17) 0
RF .... (SKIP TO C17) 7
DK .... (SKIP TO C17) 8

A. Under those more conservative I.F.R weather minimums, what is the minimum number of **miles of visibility** you or your organization require?

IFR MILES VISIBILITY .... |__|__|__|__|

B. Under those conservative I.F.R weather minimums, what is the **minimum ceiling in feet** you require?

IFR IN FEET CEILING .... |__|__|__|__|__|

GC17. **IF C15 IS 0, 7,8 OR 9, SKIP TO C18.** During the last flight you flew where you filed I.F.R, did the aircraft have (READ QUESTIONS)?

	NO	YES	RF	DK
A. Weather radar or thunderstorm detection equipment	0	1	7	8
B. Autopilot, including wing levelers	0	1	7	8
C. **AIRPLANES ONLY.** Anti-icing equipment that is approved for flight in icing conditions	0	1	7	8

GC18. (On how many of the [# FLIGHTS IN C15] flights when you filed an I.F.R flight plan/When you filed the I.F.R. flight plan), did you fly an instrument approach to land in I.M.C.?
IMC = INSTRUMENT METEOROLOGICAL CONDITIONS: VISIBILITY LESS THAN 3 MILES AND/OR CLOUD CEILING LESS THAN 1,000 FEET ABOVE GROUND LEVEL.

INSTRUMENT LANDING IMC .... |__|__|__|

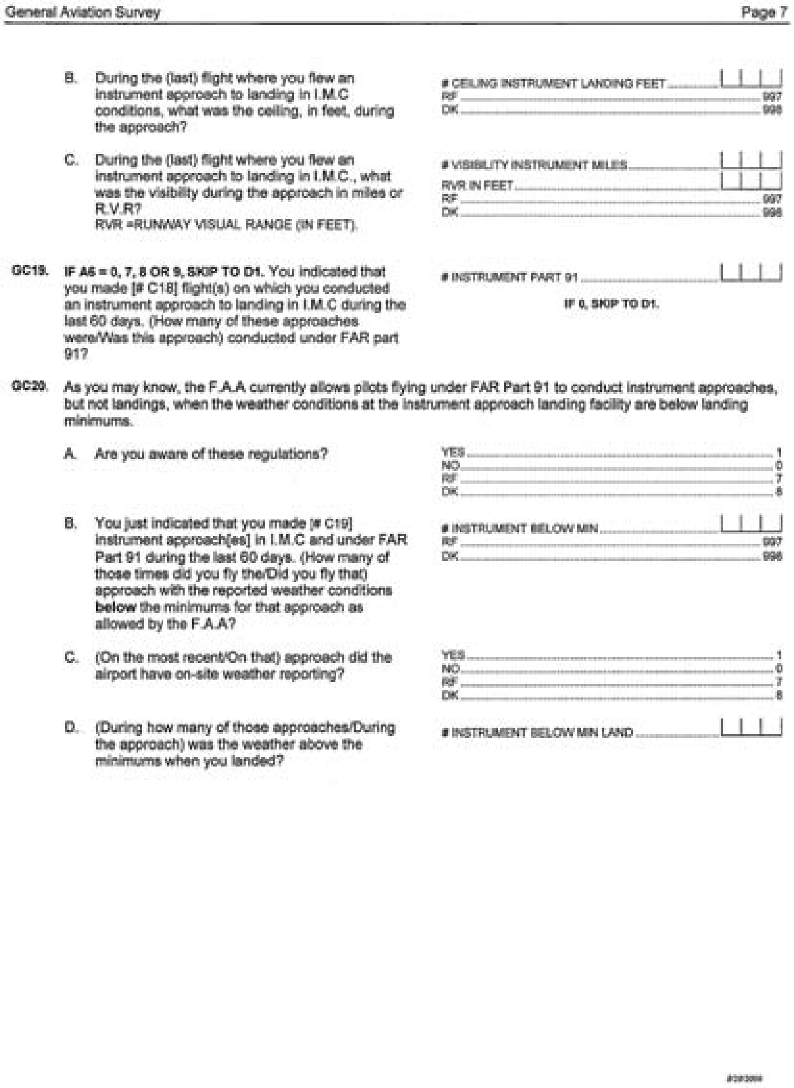
IF 0, SKIP TO D1. CANNOT BE GREATER THAN C15.

A. During the (last) flight where you flew an instrument approach to landing in I.M.C conditions, what type approach was flown?
DO **NOT** READ UNLESS REQUESTED.

I.L.S. (INSTRUMENT LANDING SYSTEM) 01
V.O.R. (VERY-HIGH FREQUENCY OMNI RANGE) 02
R.N.A.V. (RADAR NAVIGATION – R-nav) 03
G.P.S. (GEODESIC POSITION SYSTEM) 04
L.D.A. (LIMITED DESCENT ALTITUDE) 05
S.D.F. (SIMPLIFIED DIRECTIONAL FACILITY) 06
N.D.B. (NON-DIRECTIONAL BEACON) 07
BACK COURSE I.L.S 08
SOMETHING ELSE .... (ASK C18A1) 09
RF 7
DK 8

1. What other approach was flown?

SPECIFY: ____________________



B. During the (last) flight where you flew an instrument approach to landing in I.M.C conditions, what was the ceiling, in feet, during the approach?

CEILING INSTRUMENT LANDING FEET .... ☐☐☐
RF 997
DK 998

C. During the (last) flight where you flew an instrument approach to landing in I.M.C., what was the visibility during the approach in miles or R.V.R?
RVR =RUNWAY VISUAL RANGE (IN FEET).

VISIBILITY INSTRUMENT MILES .... ☐☐☐
RVR IN FEET .... ☐☐☐
RF 997
DK 998

GC19. **IF A6 = 0, 7, 8 OR 9, SKIP TO D1.** You indicated that you made [# C18] flight(s) on which you conducted an instrument approach to landing in I.M.C during the last 60 days. (How many of these approaches were/Was this approach) conducted under FAR part 91?

INSTRUMENT PART 91 .... ☐☐☐

IF 0, SKIP TO D1.

GC20. As you may know, the F.A.A currently allows pilots flying under FAR Part 91 to conduct instrument approaches, but not landings, when the weather conditions at the instrument approach landing facility are below landing minimums.

A. Are you aware of these regulations?

YES 1
NO 0
RF 7
DK 8

B. You just indicated that you made [# C19] instrument approach[es] in I.M.C and under FAR Part 91 during the last 60 days. (How many of those times did you fly the/Did you fly that) approach with the reported weather conditions **below** the minimums for that approach as allowed by the F.A.A?

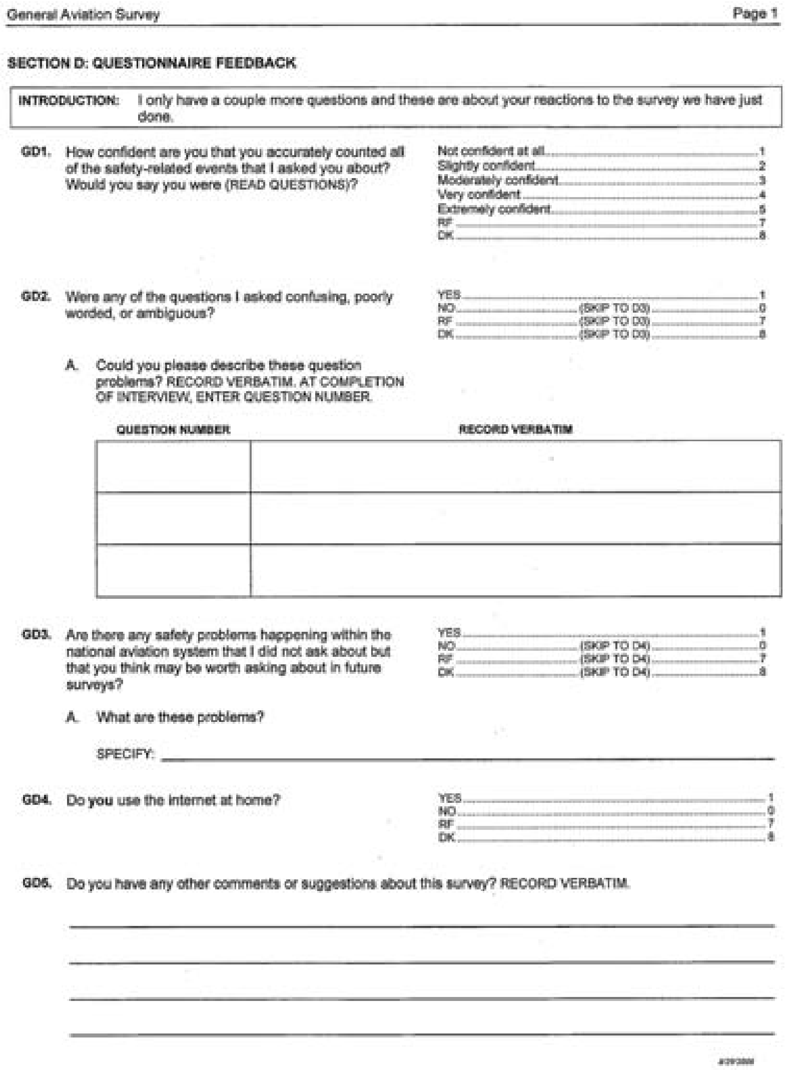
INSTRUMENT BELOW MIN .... ☐☐☐
RF 997
DK 998

C. (On the most recent/On that) approach did the airport have on-site weather reporting?

YES 1
NO 0
RF 7
DK 8

D. (During how many of those approaches/During the approach) was the weather above the minimums when you landed?

INSTRUMENT BELOW MIN LAND .... ☐☐☐



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SECTION D: QUESTIONNAIRE FEEDBACK

INTRODUCTION: I only have a couple more questions and these are about your reactions to the survey we have just done.

GD1. How confident are you that you accurately counted all of the safety-related events that I asked you about? Would you say you were (READ QUESTIONS)?

Not confident at all	1
Slightly confident	2
Moderately confident	3
Very confident	4
Extremely confident	5
RF	7
DK	8

GD2. Were any of the questions I asked confusing, poorly worded, or ambiguous?

YES		1
NO	(SKIP TO D3)	0
RF	(SKIP TO D3)	7
DK	(SKIP TO D3)	8

A. Could you please describe these question problems? RECORD VERBATIM. AT COMPLETION OF INTERVIEW, ENTER QUESTION NUMBER.

QUESTION NUMBER	RECORD VERBATIM

GD3. Are there any safety problems happening within the national aviation system that I did not ask about but that you think may be worth asking about in future surveys?

YES		1
NO	(SKIP TO D4)	0
RF	(SKIP TO D4)	7
DK	(SKIP TO D4)	8

A. What are these problems?

SPECIFY: ______________________________

GD4. Do you use the internet at home?

YES	1
NO	0
RF	7
DK	8

GD5. Do you have any other comments or suggestions about this survey? RECORD VERBATIM.

____

____

____

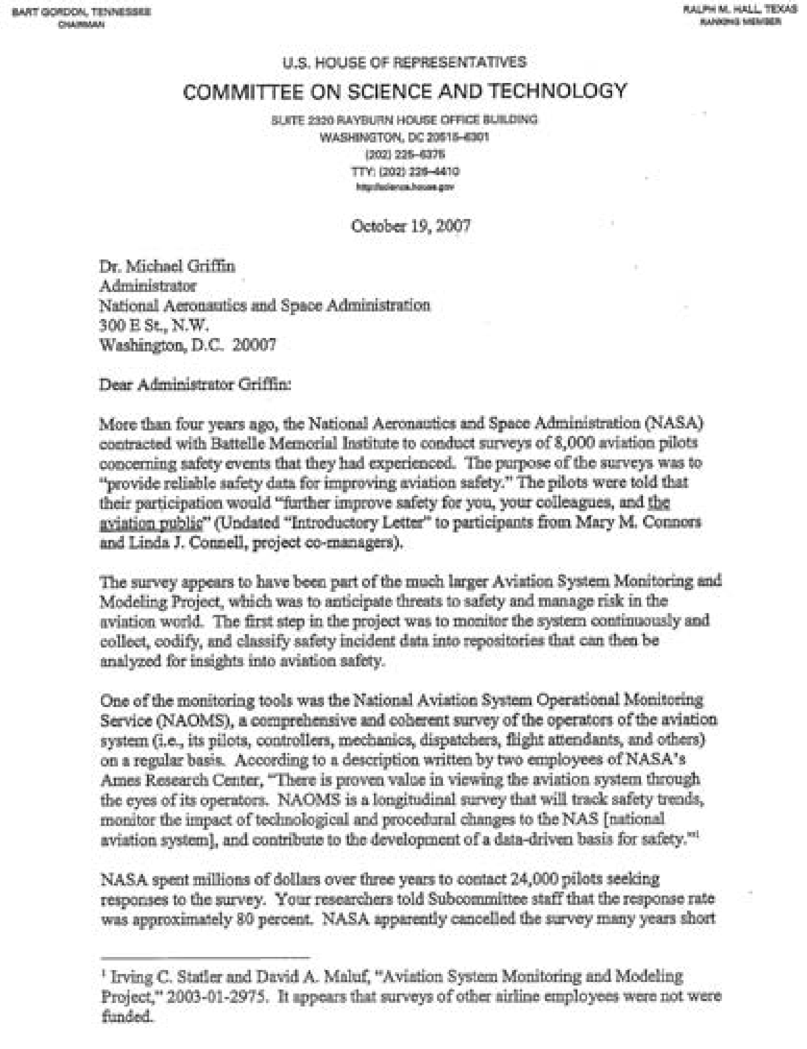
____

____

ENDINT **Again, thank you very much for your time and your help with this survey. Your input will help the aviation industry a great deal to measure the level of safety in the aviation system and will be held in confidence.**

QUESTIONNAIRE LENGTH: QUESTIONNAIRE LENGTH (MINUTES) .... |__|__|__|

Exhibit #12



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http://science.house.gov

October 19, 2007

Dr. Michael Griffin
Administrator
National Aeronautics and Space Administration
300 E St., N.W.
Washington, D.C. 20007

Dear Administrator Griffin:

More than four years ago, the National Aeronautics and Space Administration (NASA) contracted with Battelle Memorial Institute to conduct surveys of 8,000 aviation pilots concerning safety events that they had experienced. The purpose of the surveys was to "provide reliable safety data for improving aviation safety." The pilots were told that their participation would "further improve safety for you, your colleagues, and the aviation public" (Undated "Introductory Letter" to participants from Mary M. Connors and Linda J. Connell, project co-managers).

The survey appears to have been part of the much larger Aviation System Monitoring and Modeling Project, which was to anticipate threats to safety and manage risk in the aviation world. The first step in the project was to monitor the system continuously and collect, codify, and classify safety incident data into repositories that can then be analyzed for insights into aviation safety.

One of the monitoring tools was the National Aviation System Operational Monitoring Service (NAOMS), a comprehensive and coherent survey of the operators of the aviation system (i.e., its pilots, controllers, mechanics, dispatchers, flight attendants, and others) on a regular basis. According to a description written by two employees of NASA's Ames Research Center, "There is proven value in viewing the aviation system through the eyes of its operators. NAOMS is a longitudinal survey that will track safety trends, monitor the impact of technological and procedural changes to the NAS [national aviation system], and contribute to the development of a data-driven basis for safety."[1]

NASA spent millions of dollars over three years to contact 24,000 pilots seeking responses to the survey. Your researchers told Subcommittee staff that the response rate was approximately 80 percent. NASA apparently cancelled the survey many years short of completion, however, without compiling or analyzing the results. NASA also apparently cancelled plans to conduct similar surveys of ground crews, attendants, controllers and others concerning their experience on safety issues. NASA's stated reason for canceling the surveys and not analyzing the data already collected was that NASA did not have the necessary funds. Aviation safety should not be a luxury for NASA pursued only when funds are abundant; one of NASA's primary missions as established by statute is to improve the "safety and efficiency of aeronautical . . . vehicles" (Sec. 102(d)(2) of the National Aeronautics and Space Act). The data appears to have great value to aviation safety, but not on a shelf at NASA, apparently unread since December, 2004

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[1] Irving C. Statler and David A. Maluf, "Aviation System Monitoring and Modeling Project," 2003-01-2975. It appears that surveys of other airline employees were not were funded.

When another party requested the survey material under the Freedom of Information Act (FOIA), NASA denied the request, claiming that it was "commercial" information, and that **"release of the requested data, which are sensitive and safety-related, could materially affect the public confidence in, and the commercial welfare of, the air carriers and general aviation companies whose pilots participated in the survey"** (Letter dated Sept. 5, 2007 from Thomas S. Luedtke to Adam J. Rappaport; emphasis added). That stated reason does not appear to fall within any of the exceptions under FOIA to the requirement to release requested information.

Your attorneys told Subcommittee staff that there were a number of other reasons for not releasing the raw data, including confidentiality promised to the surveyed pilots. That stated reason is still less persuasive. All personal identifiers have been stripped from the data, and, in their communication, Ms. Connors and Ms. Connell promised only that a pilot's answers would "never be connected" to his or her name (Undated letter, *supra).* Additionally, a smaller self-reported aviation incident database is described in NASA's own web site as a "public repository."[2]

In addition to being outside of the recognized exception to FOIA, the reasons NASA has given for not releasing the data appears contrary to NASA's mission. The "safety and efficiency of aeronautical...vehicles" is part of NASA's mission; protecting airlines from public concern about safety is not. If NASA has information about questionable safety practices of airlines, airports, the Federal Aviation Administration, pilots or anyone else, you should have analyzed it promptly and made appropriate recommendations, or you should release the information so the public can make their own judgment about aviation safety.

Now, almost three years after the last survey was conducted, NASA researchers say they want to analyze the data and release their findings in a report after all. The new source of funds for the analysis is not NASA's and staff now voices a strong desire to prepare a draft report by the end of December. NASA would then review the report, especially if the report includes recommendations for improving flight safety in commercial aviation. The process of review will undoubtedly add many more months to the process of delivering a product to the public.

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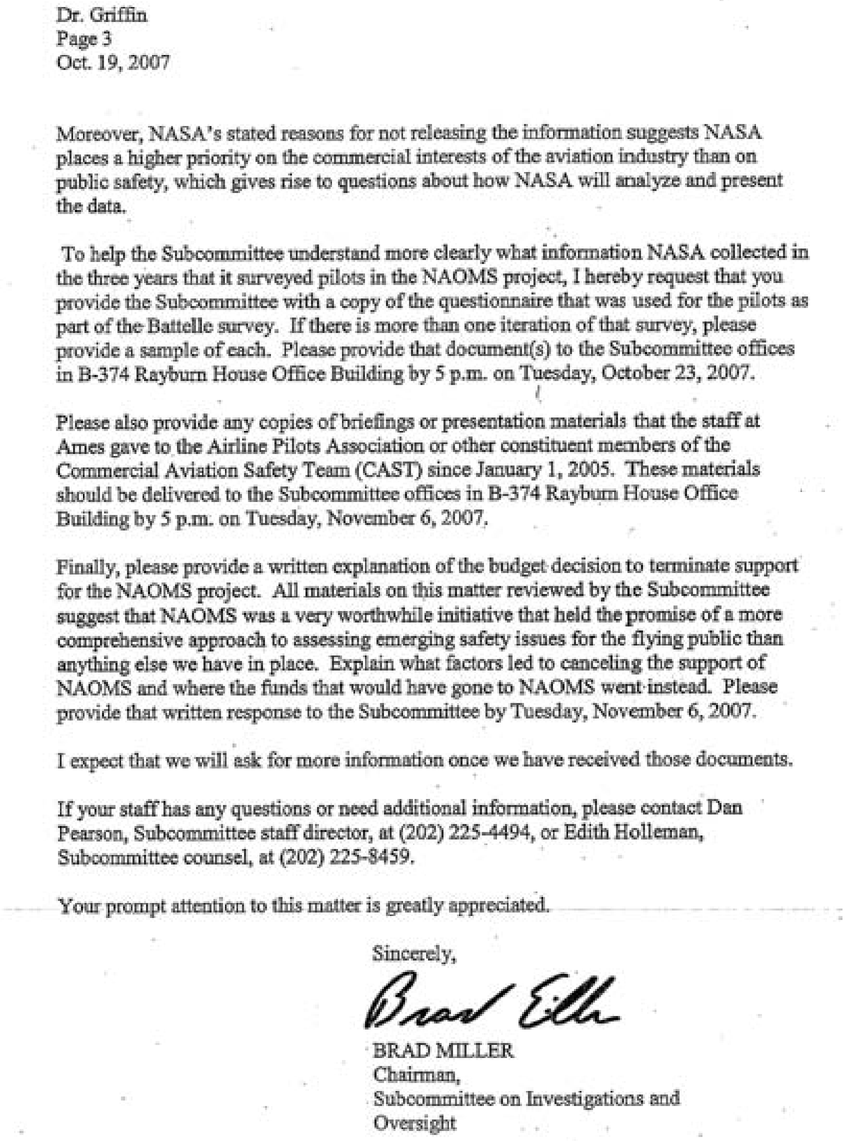
[2] "Aviation Safety Reporting System (ASRS), http://human-factors.arc.nasa.gov/awards_pubs/factsheet_view.php?factsheet_id=37



Dr. Griffin
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Moreover, NASA's stated reasons for not releasing the information suggests NASA places a higher priority on the commercial interests of the aviation industry than on public safety, which gives rise to questions about how NASA will analyze and present the data.

To help the Subcommittee understand more clearly what information NASA collected in the three years that it surveyed pilots in the NAOMS project, I hereby request that you provide the Subcommittee with a copy of the questionnaire that was used for the pilots as part of the Battelle survey. If there is more than one iteration of that survey, please provide a sample of each. Please provide that document(s) to the Subcommittee offices in B-374 Rayburn House Office Building by 5 p.m. on Tuesday, October 23, 2007.

Please also provide any copies of briefings or presentation materials that the staff at Ames gave to the Airline Pilots Association or other constituent members of the Commercial Aviation Safety Team (CAST) since January 1, 2005. These materials should be delivered to the Subcommittee offices in B-374 Rayburn House Office Building by 5 p.m. on Tuesday, November 6, 2007.

Finally, please provide a written explanation of the budget decision to terminate support for the NAOMS project. All materials on this matter reviewed by the Subcommittee suggest that NAOMS was a very worthwhile initiative that held the promise of a more comprehensive approach to assessing emerging safety issues for the flying public than anything else we have in place. Explain what factors led to canceling the support of NAOMS and where the funds that would have gone to NAOMS went instead. Please provide that written response to the Subcommittee by Tuesday, November 6, 2007.

I expect that we will ask for more information once we have received those documents.

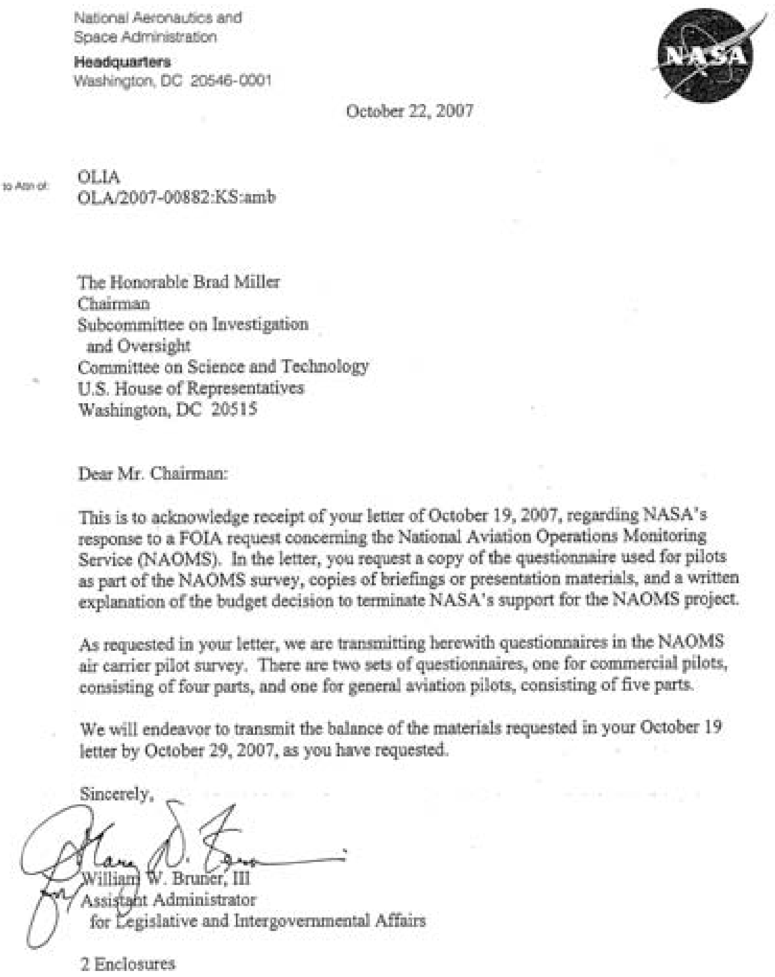
If your staff has any questions or need additional information, please contact Dan Pearson, Subcommittee staff director, at (202) 225-4494, or Edith Holleman, Subcommittee counsel, at (202) 225-8459.

Your prompt attention to this matter is greatly appreciated.

Sincerely,

BRAD MILLER
Chairman,
Subcommittee on Investigations and
Oversight

Exhibit #13



National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

October 22, 2007

Reply to Attn of: OLIA
OLA/2007-00882:KS:amb

The Honorable Brad Miller
Chairman
Subcommittee on Investigation
and Oversight
Committee on Science and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

This is to acknowledge receipt of your letter of October 19, 2007, regarding NASA's response to a FOIA request concerning the National Aviation Operations Monitoring Service (NAOMS). In the letter, you request a copy of the questionnaire used for pilots as part of the NAOMS survey, copies of briefings or presentation materials, and a written explanation of the budget decision to terminate NASA's support for the NAOMS project.

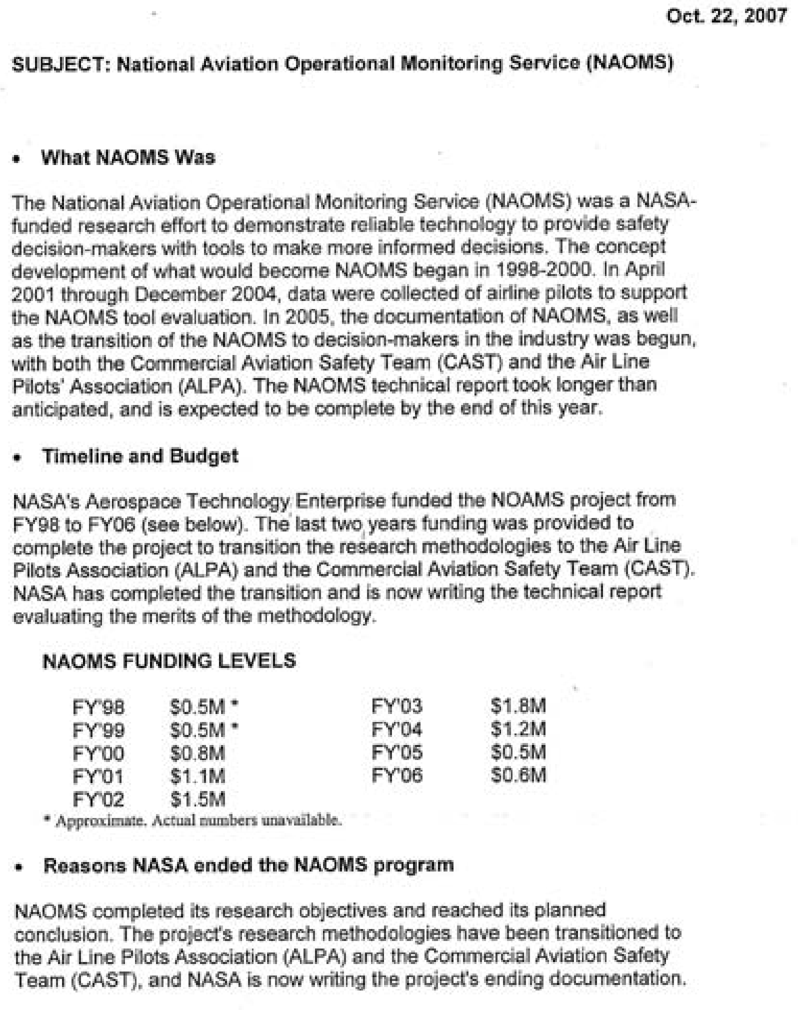
As requested in your letter, we are transmitting herewith questionnaires in the NAOMS air carrier pilot survey. There are two sets of questionnaires, one for commercial pilots, consisting of four parts, and one for general aviation pilots, consisting of five parts.

We will endeavor to transmit the balance of the materials requested in your October 19 letter by October 29, 2007, as you have requested.

Sincerely,

William W. Bruner, III
Assistant Administrator
for Legislative and Intergovernmental Affairs

2 Enclosures



Oct. 22, 2007

SUBJECT: National Aviation Operational Monitoring Service (NAOMS)

- **What NAOMS Was**

The National Aviation Operational Monitoring Service (NAOMS) was a NASA-funded research effort to demonstrate reliable technology to provide safety decision-makers with tools to make more informed decisions. The concept development of what would become NAOMS began in 1998-2000. In April 2001 through December 2004, data were collected of airline pilots to support the NAOMS tool evaluation. In 2005, the documentation of NAOMS, as well as the transition of the NAOMS to decision-makers in the industry was begun, with both the Commercial Aviation Safety Team (CAST) and the Air Line Pilots' Association (ALPA). The NAOMS technical report took longer than anticipated, and is expected to be complete by the end of this year.

- **Timeline and Budget**

NASA's Aerospace Technology Enterprise funded the NOAMS project from FY98 to FY06 (see below). The last two years funding was provided to complete the project to transition the research methodologies to the Air Line Pilots Association (ALPA) and the Commercial Aviation Safety Team (CAST). NASA has completed the transition and is now writing the technical report evaluating the merits of the methodology.

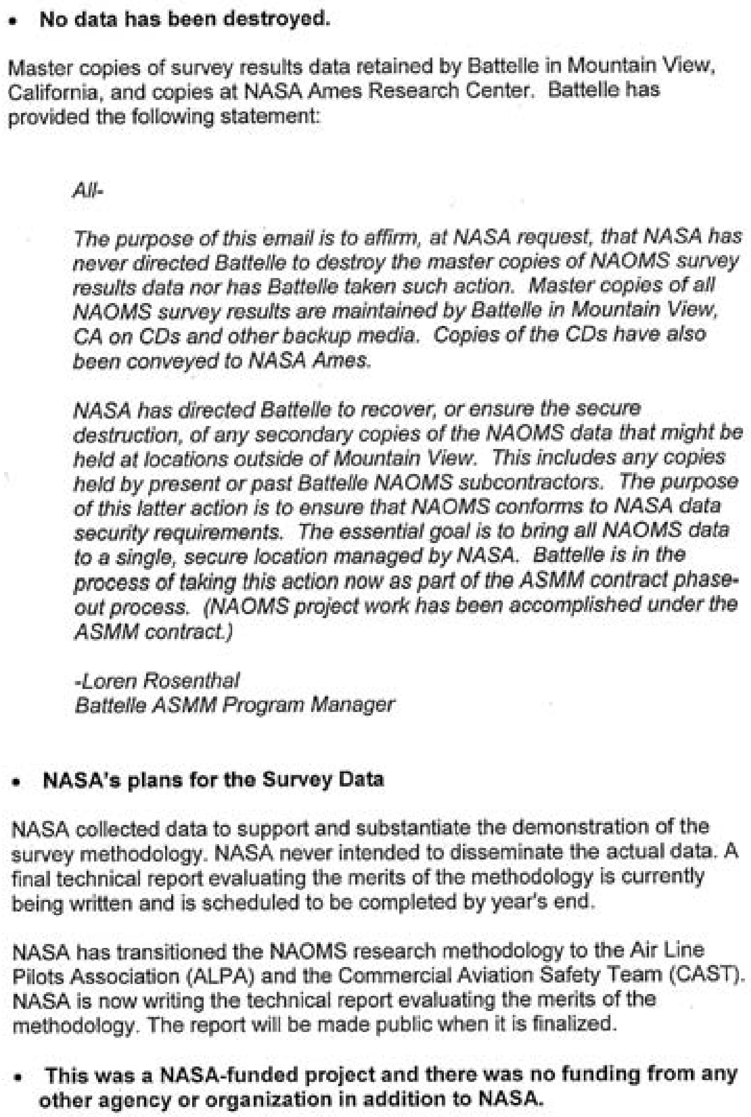
NAOMS FUNDING LEVELS

FY'98	$0.5M *	FY'03	$1.8M
FY'99	$0.5M *	FY'04	$1.2M
FY'00	$0.8M	FY'05	$0.5M
FY'01	$1.1M	FY'06	$0.6M
FY'02	$1.5M		

* Approximate. Actual numbers unavailable.

- **Reasons NASA ended the NAOMS program**

NAOMS completed its research objectives and reached its planned conclusion. The project's research methodologies have been transitioned to the Air Line Pilots Association (ALPA) and the Commercial Aviation Safety Team (CAST), and NASA is now writing the project's ending documentation.



- **No data has been destroyed.**

Master copies of survey results data retained by Battelle in Mountain View, California, and copies at NASA Ames Research Center. Battelle has provided the following statement:

> *All-*
>
> *The purpose of this email is to affirm, at NASA request, that NASA has never directed Battelle to destroy the master copies of NAOMS survey results data nor has Battelle taken such action. Master copies of all NAOMS survey results are maintained by Battelle in Mountain View, CA on CDs and other backup media. Copies of the CDs have also been conveyed to NASA Ames.*
>
> *NASA has directed Battelle to recover, or ensure the secure destruction, of any secondary copies of the NAOMS data that might be held at locations outside of Mountain View. This includes any copies held by present or past Battelle NAOMS subcontractors. The purpose of this latter action is to ensure that NAOMS conforms to NASA data security requirements. The essential goal is to bring all NAOMS data to a single, secure location managed by NASA. Battelle is in the process of taking this action now as part of the ASMM contract phase-out process. (NAOMS project work has been accomplished under the ASMM contract.)*
>
> *-Loren Rosenthal*
> *Battelle ASMM Program Manager*

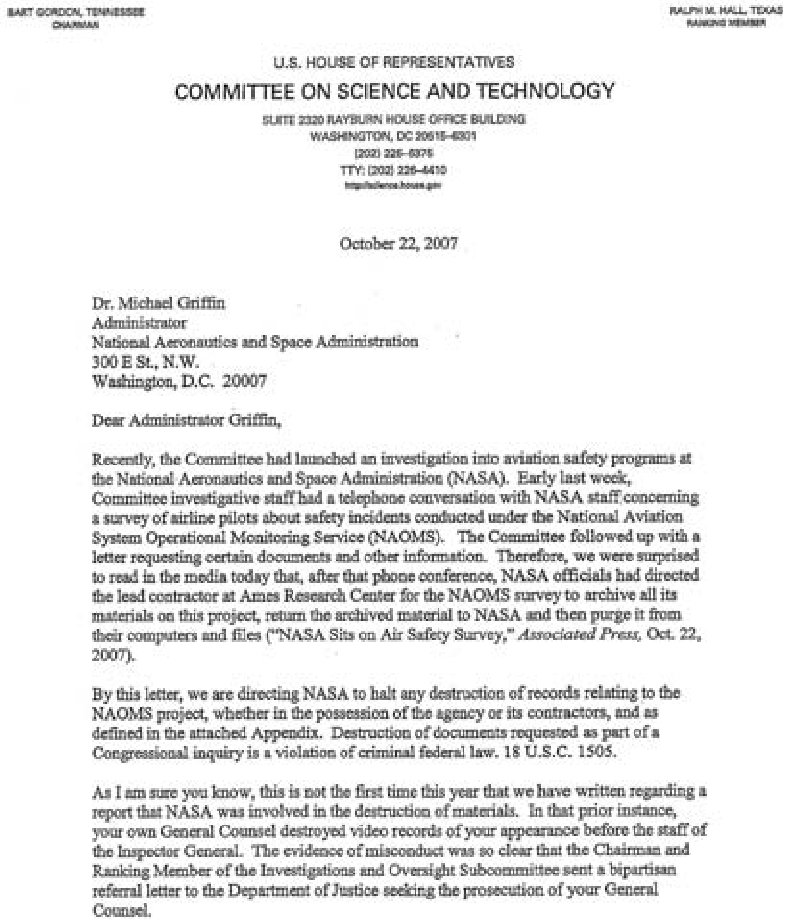
- **NASA's plans for the Survey Data**

NASA collected data to support and substantiate the demonstration of the survey methodology. NASA never intended to disseminate the actual data. A final technical report evaluating the merits of the methodology is currently being written and is scheduled to be completed by year's end.

NASA has transitioned the NAOMS research methodology to the Air Line Pilots Association (ALPA) and the Commercial Aviation Safety Team (CAST). NASA is now writing the technical report evaluating the merits of the methodology. The report will be made public when it is finalized.

- **This was a NASA-funded project and there was no funding from any other agency or organization in addition to NASA.**

Exhibit #14



BART GORDON, TENNESSEE
CHAIRMAN

RALPH M. HALL, TEXAS
RANKING MEMBER

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY
SUITE 2320 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6301
(202) 225-6375
TTY: (202) 226-4410
http://science.house.gov

October 22, 2007

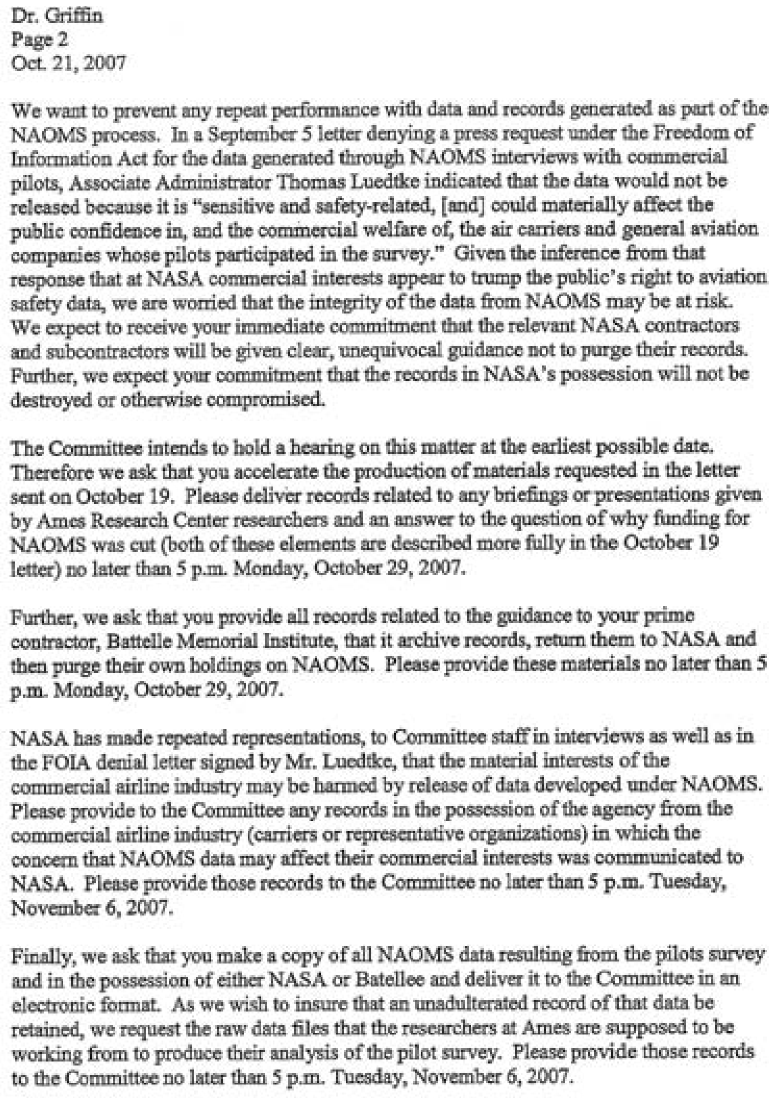
Dr. Michael Griffin
Administrator
National Aeronautics and Space Administration
300 E St., N.W.
Washington, D.C. 20007

Dear Administrator Griffin,

Recently, the Committee had launched an investigation into aviation safety programs at the National Aeronautics and Space Administration (NASA). Early last week, Committee investigative staff had a telephone conversation with NASA staff concerning a survey of airline pilots about safety incidents conducted under the National Aviation System Operational Monitoring Service (NAOMS). The Committee followed up with a letter requesting certain documents and other information. Therefore, we were surprised to read in the media today that, after that phone conference, NASA officials had directed the lead contractor at Ames Research Center for the NAOMS survey to archive all its materials on this project, return the archived material to NASA and then purge it from their computers and files ("NASA Sits on Air Safety Survey," *Associated Press,* Oct. 22, 2007).

By this letter, we are directing NASA to halt any destruction of records relating to the NAOMS project, whether in the possession of the agency or its contractors, and as defined in the attached Appendix. Destruction of documents requested as part of a Congressional inquiry is a violation of criminal federal law. 18 U.S.C. 1505.

As I am sure you know, this is not the first time this year that we have written regarding a report that NASA was involved in the destruction of materials. In that prior instance, your own General Counsel destroyed video records of your appearance before the staff of the Inspector General. The evidence of misconduct was so clear that the Chairman and Ranking Member of the Investigations and Oversight Subcommittee sent a bipartisan referral letter to the Department of Justice seeking the prosecution of your General Counsel.



Dr. Griffin
Page 2
Oct. 21, 2007

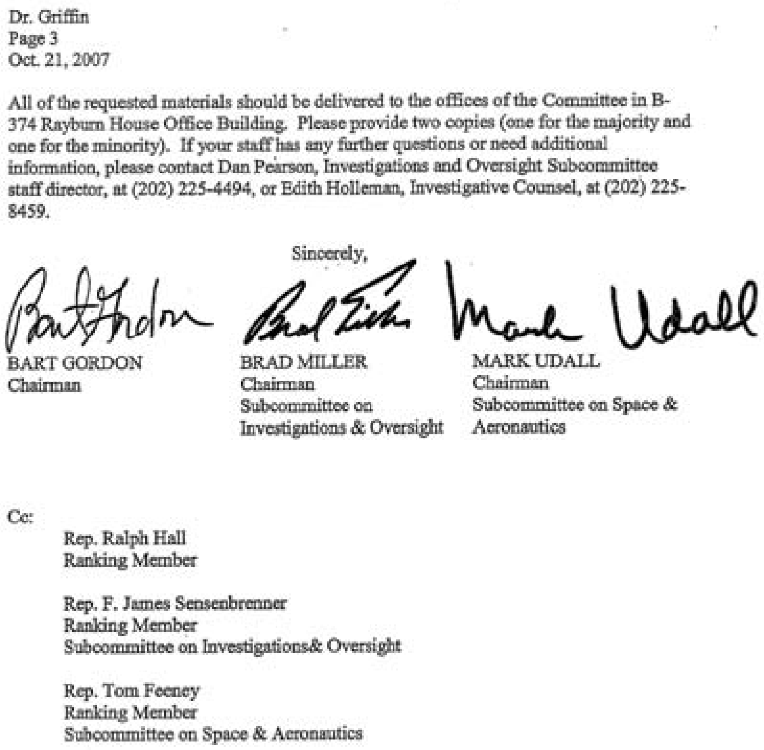
We want to prevent any repeat performance with data and records generated as part of the NAOMS process. In a September 5 letter denying a press request under the Freedom of Information Act for the data generated through NAOMS interviews with commercial pilots, Associate Administrator Thomas Luedtke indicated that the data would not be released because it is "sensitive and safety-related, [and] could materially affect the public confidence in, and the commercial welfare of, the air carriers and general aviation companies whose pilots participated in the survey." Given the inference from that response that at NASA commercial interests appear to trump the public's right to aviation safety data, we are worried that the integrity of the data from NAOMS may be at risk. We expect to receive your immediate commitment that the relevant NASA contractors and subcontractors will be given clear, unequivocal guidance not to purge their records. Further, we expect your commitment that the records in NASA's possession will not be destroyed or otherwise compromised.

The Committee intends to hold a hearing on this matter at the earliest possible date. Therefore we ask that you accelerate the production of materials requested in the letter sent on October 19. Please deliver records related to any briefings or presentations given by Ames Research Center researchers and an answer to the question of why funding for NAOMS was cut (both of these elements are described more fully in the October 19 letter) no later than 5 p.m. Monday, October 29, 2007.

Further, we ask that you provide all records related to the guidance to your prime contractor, Battelle Memorial Institute, that it archive records, return them to NASA and then purge their own holdings on NAOMS. Please provide these materials no later than 5 p.m. Monday, October 29, 2007.

NASA has made repeated representations, to Committee staff in interviews as well as in the FOIA denial letter signed by Mr. Luedtke, that the material interests of the commercial airline industry may be harmed by release of data developed under NAOMS. Please provide to the Committee any records in the possession of the agency from the commercial airline industry (carriers or representative organizations) in which the concern that NAOMS data may affect their commercial interests was communicated to NASA. Please provide those records to the Committee no later than 5 p.m. Tuesday, November 6, 2007.

Finally, we ask that you make a copy of all NAOMS data resulting from the pilots survey and in the possession of either NASA or Batellee and deliver it to the Committee in an electronic format. As we wish to insure that an unadulterated record of that data be retained, we request the raw data files that the researchers at Ames are supposed to be working from to produce their analysis of the pilot survey. Please provide those records to the Committee no later than 5 p.m. Tuesday, November 6, 2007.



Dr. Griffin
Page 3
Oct. 21, 2007

All of the requested materials should be delivered to the offices of the Committee in B-374 Rayburn House Office Building. Please provide two copies (one for the majority and one for the minority). If your staff has any further questions or need additional information, please contact Dan Pearson, Investigations and Oversight Subcommittee staff director, at (202) 225-4494, or Edith Holleman, Investigative Counsel, at (202) 225-8459.

Sincerely,

Bart Gordon
BART GORDON
Chairman

Brad Miller
BRAD MILLER
Chairman
Subcommittee on
Investigations & Oversight

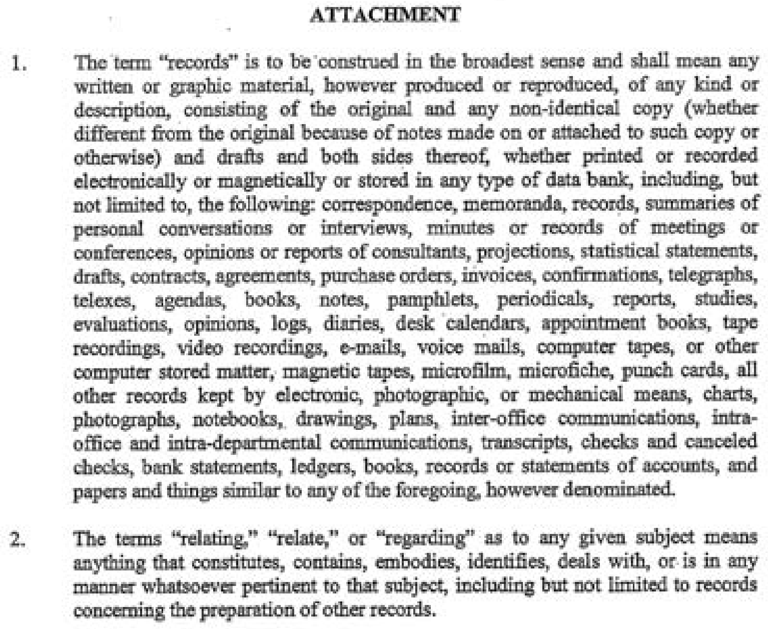
Mark Udall
MARK UDALL
Chairman
Subcommittee on Space &
Aeronautics

Cc:

Rep. Ralph Hall
Ranking Member

Rep. F. James Sensenbrenner
Ranking Member
Subcommittee on Investigations& Oversight

Rep. Tom Feeney
Ranking Member
Subcommittee on Space & Aeronautics

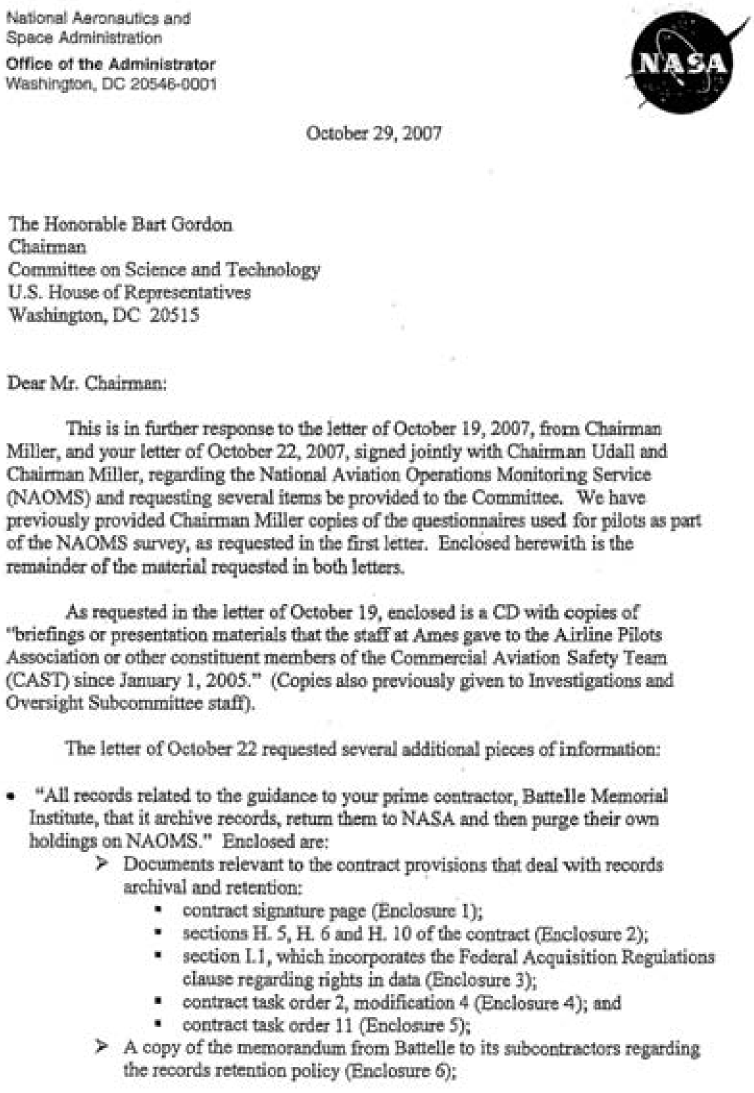


ATTACHMENT

1. The term "records" is to be construed in the broadest sense and shall mean any written or graphic material, however produced or reproduced, of any kind or description, consisting of the original and any non-identical copy (whether different from the original because of notes made on or attached to such copy or otherwise) and drafts and both sides thereof, whether printed or recorded electronically or magnetically or stored in any type of data bank, including, but not limited to, the following: correspondence, memoranda, records, summaries of personal conversations or interviews, minutes or records of meetings or conferences, opinions or reports of consultants, projections, statistical statements, drafts, contracts, agreements, purchase orders, invoices, confirmations, telegraphs, telexes, agendas, books, notes, pamphlets, periodicals, reports, studies, evaluations, opinions, logs, diaries, desk calendars, appointment books, tape recordings, video recordings, e-mails, voice mails, computer tapes, or other computer stored matter, magnetic tapes, microfilm, microfiche, punch cards, all other records kept by electronic, photographic, or mechanical means, charts, photographs, notebooks, drawings, plans, inter-office communications, intra-office and intra-departmental communications, transcripts, checks and canceled checks, bank statements, ledgers, books, records or statements of accounts, and papers and things similar to any of the foregoing, however denominated.

2. The terms "relating," "relate," or "regarding" as to any given subject means anything that constitutes, contains, embodies, identifies, deals with, or is in any manner whatsoever pertinent to that subject, including but not limited to records concerning the preparation of other records.

Exhibit #15



National Aeronautics and
Space Administration
Office of the Administrator
Washington, DC 20546-0001

October 29, 2007

The Honorable Bart Gordon
Chairman
Committee on Science and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

This is in further response to the letter of October 19, 2007, from Chairman Miller, and your letter of October 22, 2007, signed jointly with Chairman Udall and Chairman Miller, regarding the National Aviation Operations Monitoring Service (NAOMS) and requesting several items be provided to the Committee. We have previously provided Chairman Miller copies of the questionnaires used for pilots as part of the NAOMS survey, as requested in the first letter. Enclosed herewith is the remainder of the material requested in both letters.

As requested in the letter of October 19, enclosed is a CD with copies of "briefings or presentation materials that the staff at Ames gave to the Airline Pilots Association or other constituent members of the Commercial Aviation Safety Team (CAST) since January 1, 2005." (Copies also previously given to Investigations and Oversight Subcommittee staff).

The letter of October 22 requested several additional pieces of information:

- "All records related to the guidance to your prime contractor, Battelle Memorial Institute, that it archive records, return them to NASA and then purge their own holdings on NAOMS." Enclosed are:
  - ➢ Documents relevant to the contract provisions that deal with records archival and retention:
    - ▪ contract signature page (Enclosure 1);
    - ▪ sections H. 5, H. 6 and H. 10 of the contract (Enclosure 2);
    - ▪ section I.1, which incorporates the Federal Acquisition Regulations clause regarding rights in data (Enclosure 3);
    - ▪ contract task order 2, modification 4 (Enclosure 4); and
    - ▪ contract task order 11 (Enclosure 5);
  - ➢ A copy of the memorandum from Battelle to its subcontractors regarding the records retention policy (Enclosure 6);

  - A copy of instructions from the NASA General Counsel regarding preservation of data (Enclosure 7);
  - A copy of an e-mail from the Battelle Aviation Safety Monitoring and M Modeling Program Manager affirming that NASA has never directed Battelle to destroy the master copies of NAOMS survey results (Enclosure 8).

- Any records "from the commercial airline industry (carriers or representative organizations) in which the concern that NAOMS data may affect their commercial interests was communicated to NASA."
  - We have not found any documents responsive to this request.

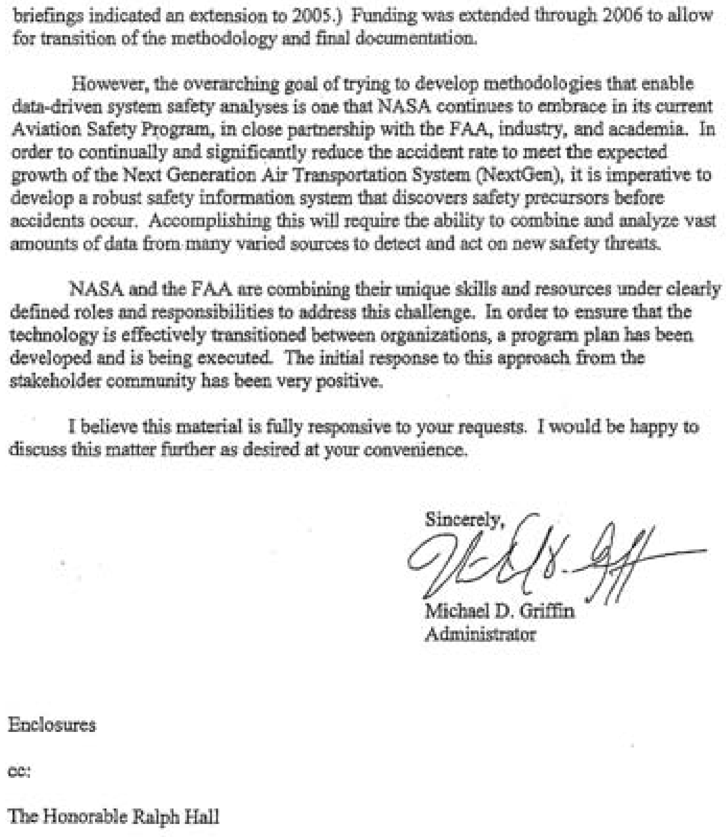
- A "copy of all NAOMS data resulting from the pilots survey and in the possession of either NASA or Battelle…in electronic format."
  - Enclosed are four CDs: Air Carrier Data April 2001 through December 2004; Air Carrier Data Joint Implementation Measurement Data Analysis Team (JIMDAT) Section C Supplement, April 2001 through December 2004; General Aviation Data, August 2002 through April 2003; and NAOMS Raw Data Air Carrier including Field Trial.

This data is in the process of being reviewed by NASA. NASA believes that the data contains both confidential commercial data and information that could compromise anonymity that should be redacted prior to public release.

The raw data file is defined as the original capture of survey participants' responses to a series of questions without any evaluation of the validity of the data points to determine if there are input errors, duplicate responses, or if the participants' responses are outside of operationally possible levels, etc. These types of errors are considered as outliers and are typically omitted from final data analyses after comprehensive statistical evaluation and assessment. As such, if any data analysis is done without considering this routine scientific step, the results could potentially be over or under representations of actual valid data. Therefore, the processed data that have these "outliers" removed have also been provided for air carrier, general aviation and JIMDAT data sets.

To ensure that no destruction of data, including that held by sub-contractors, occurred, NASA has since notified the NAOMS project management team and Battelle to retain all records related to the NAOMS project. Battelle has provided the same direction to its subcontractors.

The letter of October 19 also requested "a written explanation of the budget decision to terminate support for the NAOMS project." It has been widely reported that NAOMS funding was cut or prematurely shut down. That is not the case. When the project originated in 1998, it was intended to continue until 2004, as indicated in project briefings that were provided to various Government and industry audiences when the project began. (As mentioned above, copies of these briefings are enclosed. Later



briefings indicated an extension to 2005.) Funding was extended through 2006 to allow for transition of the methodology and final documentation.

However, the overarching goal of trying to develop methodologies that enable data-driven system safety analyses is one that NASA continues to embrace in its current Aviation Safety Program, in close partnership with the FAA, industry, and academia. In order to continually and significantly reduce the accident rate to meet the expected growth of the Next Generation Air Transportation System (NextGen), it is imperative to develop a robust safety information system that discovers safety precursors before accidents occur. Accomplishing this will require the ability to combine and analyze vast amounts of data from many varied sources to detect and act on new safety threats.

NASA and the FAA are combining their unique skills and resources under clearly defined roles and responsibilities to address this challenge. In order to ensure that the technology is effectively transitioned between organizations, a program plan has been developed and is being executed. The initial response to this approach from the stakeholder community has been very positive.

I believe this material is fully responsive to your requests. I would be happy to discuss this matter further as desired at your convenience.

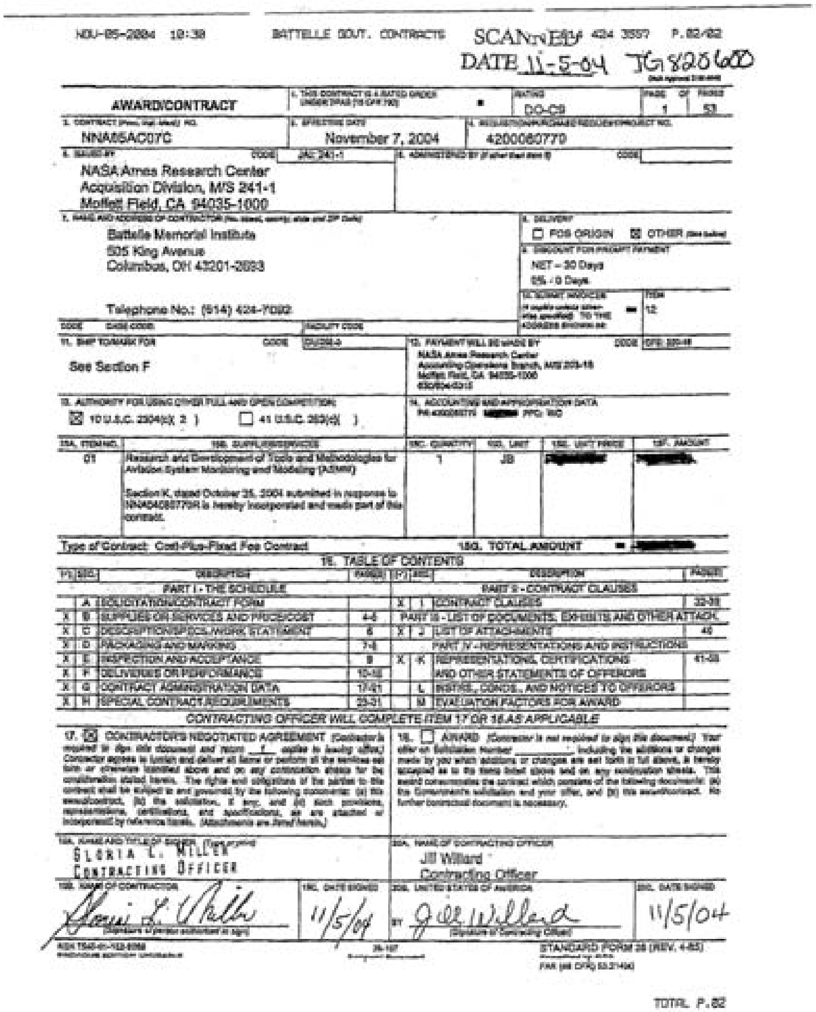
Sincerely,

Michael D. Griffin
Administrator

Enclosures

cc:

The Honorable Ralph Hall



NOV-05-2004 10:38 BATTELLE GOVT. CONTRACTS SCANNED 424 3557 P.02/02

DATE 11-5-04 TG820600

AWARD/CONTRACT

1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700) ■	RATING DO-C9	PAGE 1	OF PAGES 53
2. CONTRACT (Proc. Inst. Ident.) NO. NNA05AC07C	3. EFFECTIVE DATE November 7, 2004	4. REQUISITION/PURCHASE REQUEST/PROJECT NO. 4200080779	
5. ISSUED BY CODE JAC 241-1 NASA Ames Research Center Acquisition Division, M/S 241-1 Moffett Field, CA 94035-1000	6. ADMINISTERED BY (If other than Item 5) CODE		
7. NAME AND ADDRESS OF CONTRACTOR (No., street, county, state and ZIP Code) Battelle Memorial Institute 505 King Avenue Columbus, OH 43201-2693 Telephone No.: (614) 424-7092	8. DELIVERY ☐ FOB ORIGIN ☒ OTHER (See below) 9. DISCOUNT FOR PROMPT PAYMENT NET – 30 Days 0% / 0 Days 10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN: ITEM 12		
CODE CAGE CODE FACILITY CODE			
11. SHIP TO/MARK FOR CODE See Section F	12. PAYMENT WILL BE MADE BY CODE NASA Ames Research Center Accounting Operations Branch, M/S 203-18 Moffett Field, CA 94035-1000		
13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: ☒ 10 U.S.C. 2304(c)(2) ☐ 41 U.S.C. 253(c)( )	14. ACCOUNTING AND APPROPRIATION DATA [redacted] PPC: NO		

15A. ITEM NO.	15B. SUPPLIES/SERVICES	15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
01	Research and Development of Tools and Methodologies for Aviation System Monitoring and Modeling (ASMM) Section K, dated October 25, 2004 submitted in response to NNA04080779R is hereby incorporated and made part of this contract.	1	JB	[redacted]	[redacted]

Type of Contract: Cost-Plus-Fixed Fee Contract 15G. TOTAL AMOUNT ■ [redacted]

16. TABLE OF CONTENTS

(✓)	SEC.	DESCRIPTION	PAGE(S)	(✓)	SEC.	DESCRIPTION	PAGE(S)
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X	B	SUPPLIES OR SERVICES AND PRICE/COST	4-5			PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.	
X	C	DESCRIPTION/SPECS./WORK STATEMENT	6	X	J	LIST OF ATTACHMENTS	40
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CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE

17. ☒ CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return 1 copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)

18. ☐ AWARD (Contractor is not required to sign this document.) Your offer on Solicitation Number ________, including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.

19A. NAME AND TITLE OF SIGNER (Type or print) GLORIA L. MILLER CONTRACTING OFFICER		20A. NAME OF CONTRACTING OFFICER Jill Willard Contracting Officer	
19B. NAME OF CONTRACTOR Gloria L. Miller (Signature of person authorized to sign)	19C. DATE SIGNED 11/5/04	20B. UNITED STATES OF AMERICA BY Jill Willard (Signature of Contracting Officer)	20C. DATE SIGNED 11/5/04

NSN 7540-01-152-8069
PREVIOUS EDITION UNUSABLE

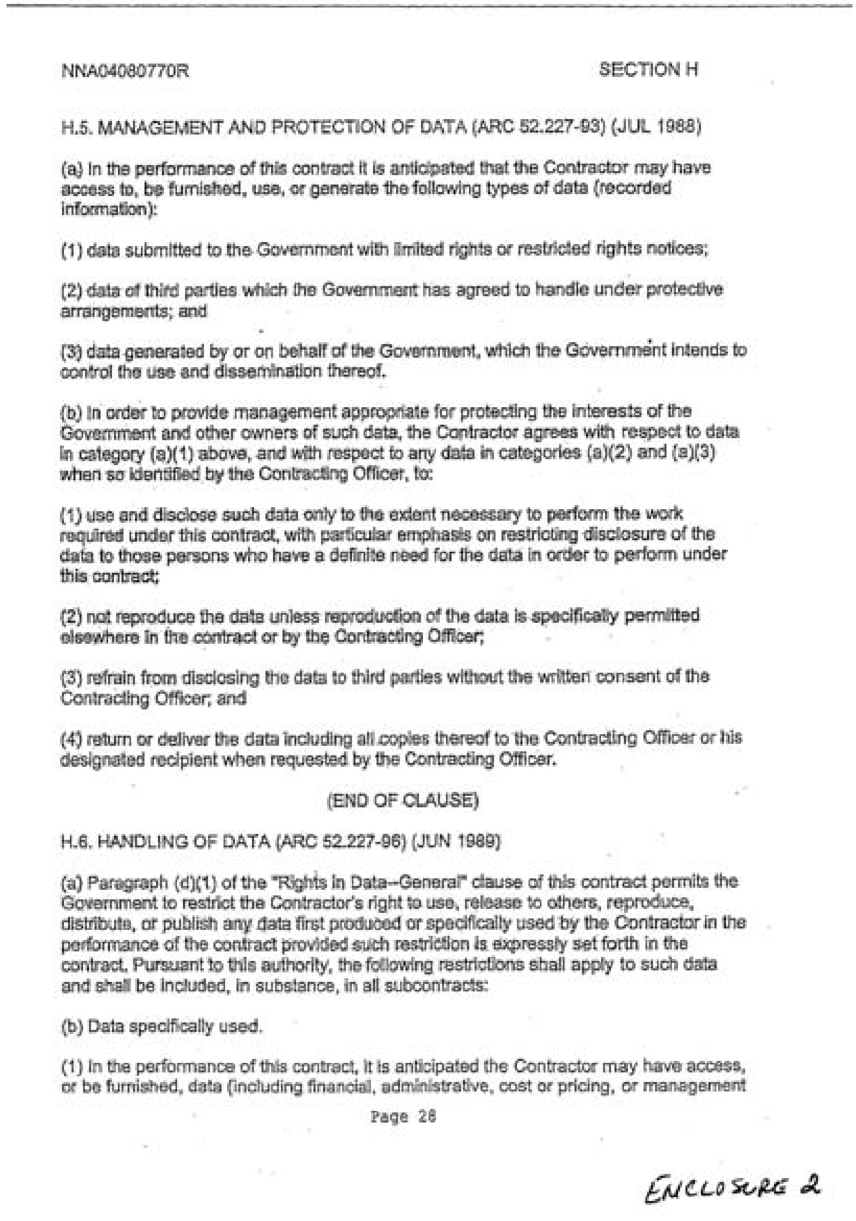
26-107

STANDARD FORM 26 (REV. 4-85)
Prescribed by GSA
FAR (48 CFR) 53.214(a)

TOTAL P.02

11/04/2004 22:16 650804437777 PAGE 02

ENCLOSURE 1



H.5. MANAGEMENT AND PROTECTION OF DATA (ARC 52.227-93) (JUL 1988)

(a) In the performance of this contract it is anticipated that the Contractor may have access to, be furnished, use, or generate the following types of data (recorded information):

(1) data submitted to the Government with limited rights or restricted rights notices;

(2) data of third parties which the Government has agreed to handle under protective arrangements; and

(3) data generated by or on behalf of the Government, which the Government intends to control the use and dissemination thereof.

(b) In order to provide management appropriate for protecting the interests of the Government and other owners of such data, the Contractor agrees with respect to data in category (a)(1) above, and with respect to any data in categories (a)(2) and (a)(3) when so identified by the Contracting Officer, to:

(1) use and disclose such data only to the extent necessary to perform the work required under this contract, with particular emphasis on restricting disclosure of the data to those persons who have a definite need for the data in order to perform under this contract;

(2) not reproduce the data unless reproduction of the data is specifically permitted elsewhere in the contract or by the Contracting Officer;

(3) refrain from disclosing the data to third parties without the written consent of the Contracting Officer; and

(4) return or deliver the data including all copies thereof to the Contracting Officer or his designated recipient when requested by the Contracting Officer.

(END OF CLAUSE)

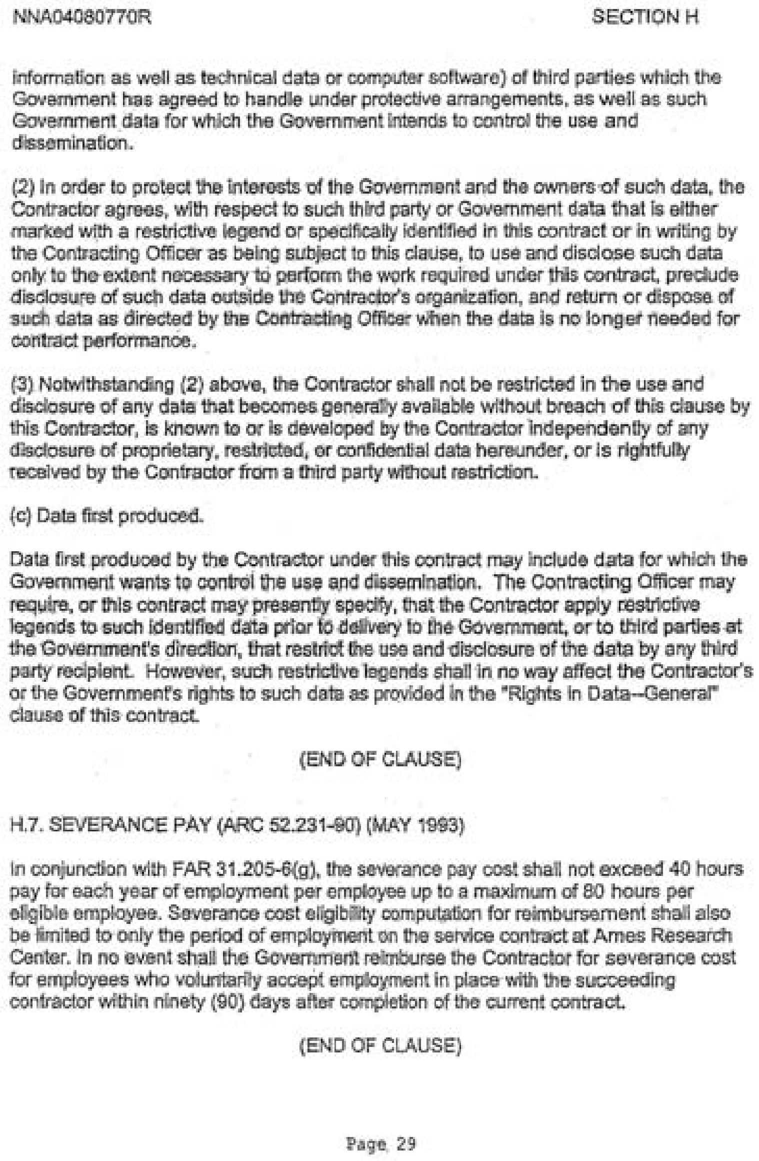
H.6. HANDLING OF DATA (ARC 52.227-96) (JUN 1989)

(a) Paragraph (d)(1) of the "Rights in Data--General" clause of this contract permits the Government to restrict the Contractor's right to use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of the contract provided such restriction is expressly set forth in the contract. Pursuant to this authority, the following restrictions shall apply to such data and shall be included, in substance, in all subcontracts:

(b) Data specifically used.

(1) In the performance of this contract, it is anticipated the Contractor may have access, or be furnished, data (including financial, administrative, cost or pricing, or management

ENCLOSURE 2



information as well as technical data or computer software) of third parties which the Government has agreed to handle under protective arrangements, as well as such Government data for which the Government intends to control the use and dissemination.

(2) In order to protect the interests of the Government and the owners of such data, the Contractor agrees, with respect to such third party or Government data that is either marked with a restrictive legend or specifically identified in this contract or in writing by the Contracting Officer as being subject to this clause, to use and disclose such data only to the extent necessary to perform the work required under this contract, preclude disclosure of such data outside the Contractor's organization, and return or dispose of such data as directed by the Contracting Officer when the data is no longer needed for contract performance.

(3) Notwithstanding (2) above, the Contractor shall not be restricted in the use and disclosure of any data that becomes generally available without breach of this clause by this Contractor, is known to or is developed by the Contractor independently of any disclosure of proprietary, restricted, or confidential data hereunder, or is rightfully received by the Contractor from a third party without restriction.

(c) Data first produced.

Data first produced by the Contractor under this contract may include data for which the Government wants to control the use and dissemination. The Contracting Officer may require, or this contract may presently specify, that the Contractor apply restrictive legends to such identified data prior to delivery to the Government, or to third parties at the Government's direction, that restrict the use and disclosure of the data by any third party recipient. However, such restrictive legends shall in no way affect the Contractor's or the Government's rights to such data as provided in the "Rights in Data--General" clause of this contract.

(END OF CLAUSE)

H.7. SEVERANCE PAY (ARC 52.231-90) (MAY 1993)

In conjunction with FAR 31.205-6(g), the severance pay cost shall not exceed 40 hours pay for each year of employment per employee up to a maximum of 80 hours per eligible employee. Severance cost eligibility computation for reimbursement shall also be limited to only the period of employment on the service contract at Ames Research Center. In no event shall the Government reimburse the Contractor for severance cost for employees who voluntarily accept employment in place with the succeeding contractor within ninety (90) days after completion of the current contract.

(END OF CLAUSE)

H.8. SUBCONTRACTING, DATA NOT FIRST PRODUCED UNDER THE CONTRACT AND REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED RIGHTS SOFTWARE (ARC 52.227-97) (OCT 2004)

It is strongly recommended that the Contractor flow down the data rights provisions of this contract to lower tier subcontractors to ensure that it can fulfill its data rights obligations to the Government. See Clause FAR 52.227-14(h), *Rights in Data—General.* The Contractor shall be held responsible to obtain rights for the Government where it fails to fulfill such obligations.

Offerors are reminded that as required by Clause FAR 52.227-14(c)(2), the Contractor must obtain Contracting Officer approval before incorporating any data not first produced under the Contract into data delivered under the contract. Before delivering such data, the Contractor must identify it and grant the Government, or acquire on its behalf, the broad licenses required by subparagraph (c) of the *Rights in Data—General* clause.

The Contractor shall make the representation required by FAR 52.227-15 for each contract task order. On a case-by-case basis, the Government will insert the purposes, rights or limitations under which the Government can use Limited Rights Data and Restricted Rights Software into the alternate clauses II and III of FAR 52.227-14.

(END OF CLAUSE)

H.9. INFORMATION INCIDENTAL TO CONTRACT ADMINISTRATION (ARC 52.227-98) (OCT 2004)

NASA shall have unlimited rights in information incidental to contract administration including administrative and management information created by the Contractor and specified for delivery to NASA in performance of the contract, expressly excluding financial information. Specifically, NASA shall have the right to release such administrative and management information to any third party to satisfy NASA's requirements.

(END OF CLAUSE)

H.10 DATA RIGHTS—HANDLING OF DATA/MANAGEMENT & PROTECTION OF DATA & SPECIAL WORKS

The Contractor is hereby instructed that the categories of data identified below are subject to the non-disclosure, handling and other required obligations of ARC 52.227-93 (Management and Protection of Data)(Clause H.5) and ARC 52.227-96 (Handling of Data)(Clause H.6) of the contract.

Please review the requirements of these clauses which include the following obligations:

(1) use and disclose such data only to the extent necessary to perform the work required under this contract, with particular emphasis on restricting disclosure of the data to those persons who have a definite need for the data in order to perform under this contract;

(2) the Contractor agrees, with respect to such third party or Government data that is either marked with a restrictive legend or specifically identified in this contract or in writing by the Contracting Officer as being subject to this clause, to use and disclose such data only to the extent necessary to perform the work required under this contract, preclude disclosure outside the Contractor's organization, and return of such data as directed by the Contracting Officer when the data is no longer needed for contract performance.

Categories of data identified under this contract:

Any flight recorded data from FOQA programs

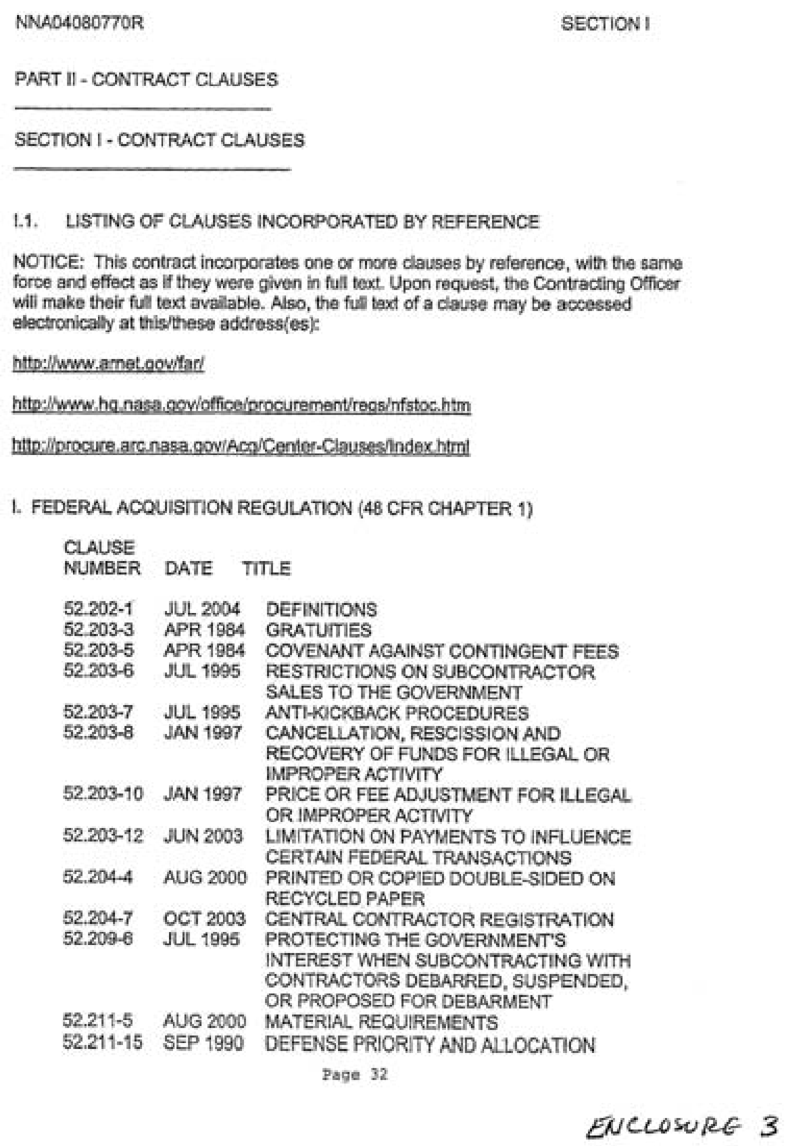
Any radar data from PDARS programs

Any safety report data from Aviation Safety Action Programs

The Contractor is hereby directed to assert copyright, or authorize assertion thereof, in special works data and to assign, or obtain the assignment of, such copyright to the Government or its designated assignee in accordance with Clause 52.227-17 Rights in Data-Special Works. The direction applies to software extensions of Morning Report to air traffic control data and distributed national FOQA archive software.

(END OF CLAUSE)

(END OF SECTION)



PART II - CONTRACT CLAUSES

SECTION I - CONTRACT CLAUSES

I.1. LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

http://www.arnet.gov/far/

http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm

http://procure.arc.nasa.gov/Acq/Center-Clauses/Index.html

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
52.202-1	JUL 2004	DEFINITIONS
52.203-3	APR 1984	GRATUITIES
52.203-5	APR 1984	COVENANT AGAINST CONTINGENT FEES
52.203-6	JUL 1995	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT
52.203-7	JUL 1995	ANTI-KICKBACK PROCEDURES
52.203-8	JAN 1997	CANCELLATION, RESCISSION AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY
52.203-10	JAN 1997	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY
52.203-12	JUN 2003	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS
52.204-4	AUG 2000	PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER
52.204-7	OCT 2003	CENTRAL CONTRACTOR REGISTRATION
52.209-6	JUL 1995	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT
52.211-5	AUG 2000	MATERIAL REQUIREMENTS
52.211-15	SEP 1990	DEFENSE PRIORITY AND ALLOCATION

ENCLOSURE 3

		REQUIREMENTS
52.215-2	JUN 1999	AUDIT AND RECORDS -- NEGOTIATION
52.215-8	OCT 1997	ORDER OF PRECEDENCE - UNIFORM CONTRACT FORMAT
52.215-10	OCT 1997	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA
52.215-11	OCT 1997	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA -- MODIFICATIONS
52.215-12	OCT 1997	SUBCONTRACTOR COST OR PRICING DATA
52.215-13	OCT 1997	SUBCONTRACTOR COST OR PRICING DATA- MODIFICATIONS
52.215-15	JAN 2004	PENSION ADJUSTMENTS AND ASSET REVERSIONS
52.215-18	OCT 1997	REVERSION OR ADJUSTMENT OF PLANS FOR POSTRETIREMENT BENEFITS (PRB) OTHER THAN PENSIONS
52.215-19	OCT 1997	NOTIFICATION OF OWNERSHIP CHANGES
52.216-7	DEC 2002	ALLOWABLE COST AND PAYMENT Insert "30 days" in Paragraph (a)(3)
52.216-8	MAR 1997	FIXED FEE
52.217-8	NOV 1999	OPTION TO EXTEND SERVICES
52.219-8	OCT 2000	UTILIZATION OF SMALL BUSINESS CONCERNS
52.219-9	JAN 2002	SMALL BUSINESS SUBCONTRACTING PLAN (ALT II)(OCT 2001)
52.219-16	JAN 1999	LIQUIDATED DAMAGES – SUBCONTRACTING PLAN
52.222-1	FEB 1997	NOTICE TO THE GOVERNMENT OF LABOR DISPUTES
52.222-2	JUL 1990	PAYMENT FOR OVERTIME PREMIUMS (INSERT: "$0" IN PARAGRAPH (a))
52.222-3	JUN 2003	CONVICT LABOR
52.222-21	FEB 1999	PROHIBITION OF SEGREGATED FACILITIES
52.222-26	APR 2002	EQUAL OPPORTUNITY
52.222-35	DEC 2001	EQUAL OPPORTUNITIES FOR SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA AND OTHER SPECIAL VETERANS
52.222-36	JUN 1998	AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES
52.222-37	DEC 2001	EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS
52.223-6	MAY 2001	DRUG-FREE WORKPLACE
52.223-14	AUG 2003	TOXIC CHEMICAL RELEASE REPORTING
52.225-1	JUN 2003	BUY AMERICAN ACT-SUPPLIES
52.225-13	DEC 2003	RESTRICTIONS ON CERTAIN FOREIGN

		PURCHASES
52.227-1	JUL 1995	AUTHORIZATION AND CONSENT (ALTERNATE I) (APR 1984)
52.227-2	AUG 1996	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT
52.227-14	JUN 1987	RIGHT IN DATA – GENERAL (ALT II) (JUN 1987) (ALT III) (JUN 1987)(AS MODIFIED BY NFS 1852.227-14, RIGHTS IN DATA – GENERAL)
52.227-16	JUN 1987	ADDITIONAL DATA REQUIREMENTS
52.227-17	JUN 1987	RIGHTS IN DATA – SPECIAL WORKS (with subparagraph (e) indemnity deleted from this clause)
52.227-19	JUN 1987	COMMERCIAL COMPUTER SOFTWARE - RESTRICTED RIGHTS
52.227-23	JUN 1987	RIGHTS TO PROPOSAL DATA (TECHNICAL) (INSERT: PAGES _______, DATED ______)
52.228-7	MAR 1996	INSURANCE-LIABILITY TO THIRD PERSONS
52.230-2	APR 1998	COST ACCOUNTING STANDARDS
52.230-3	APR 1998	DISCLOSURE AND CONSISTENCY OF COST ACCOUNTING PRACTICES
52.230-6	NOV 1999	ADMINISTRATION OF COST ACCOUNTING STANDARDS
52.232-9	APR 1984	LIMITATION ON WITHHOLDING OF PAYMENTS
52.232-17	JUN 1996	INTEREST
52.232-18	APR 1984	AVAILABILITY OF FUNDS
52.232-20	APR 1984	LIMITATION OF COST
52.232-22	APR 1984	LIMITATION OF FUNDS
52.232-23	JAN 1986	ASSIGNMENT OF CLAIMS
52.232-25	FEB 2002	PROMPT PAYMENT (ALTERNATE I) (FEB 2002)
52.232-34	MAY 1999	PAYMENT BY ELECTRONIC FUNDS TRANSFER- OTHER THAN CENTRAL CONTRACTOR REGISTRATION (Insert: "No later than 15 days prior to submission of the first request for payment" in paragraph (b)(1))
52.233-1	JUL 2002	DISPUTES (ALTERNATE I) (DEC 1991)
52.233-3	AUG 1996	PROTEST AFTER AWARD (ALTERNATE I) (JUN 1985)
52.237-3	JAN 1991	CONTINUITY OF SERVICES
52.239-1	AUG 1996	PRIVACY OR SECURITY SAFEGUARDS
52.242-1	APR 1984	NOTICE OF INTENT TO DISALLOW COSTS
52.242-3	MAY 2001	PENALTIES FOR UNALLOWABLE COSTS
52.242-4	JAN 1997	CERTIFICATION OF FINAL INDIRECT COSTS
52.242-13	JUL 1995	BANKRUPTCY
52.243-2	AUG 1987	CHANGES-COST-REIMBURSEMENT (ALT IV)(APR 1984)

52.244-2	AUG 1998	SUBCONTRACTS (ALT I)(AUG 1998)
52.244-5	DEC 1996	COMPETITION IN SUBCONTRACTING
52.245-1	APR 1984	PROPERTY RECORDS
52.245-5	MAY 2003	GOVERNMENT PROPERTY (COST-REIMBURSEMENT, TIME-AND- MATERIAL, OR LABOR-HOUR CONTRACTS)
52.245-19	APR 1984	GOVERNMENT PROPERTY FURNISHED "AS IS"
52.247-1	APR 1984	COMMERCIAL BILL OF LADING NOTATIONS
52.249-6	SEP 1996	TERMINATION (COST-REIMBURSEMENT)
52.249-14	APR 1984	EXCUSABLE DELAYS
52.251-1	APR 1984	GOVERNMENT SUPPLY SOURCES
52.253-1	JAN 1991	COMPUTER GENERATED FORM/S

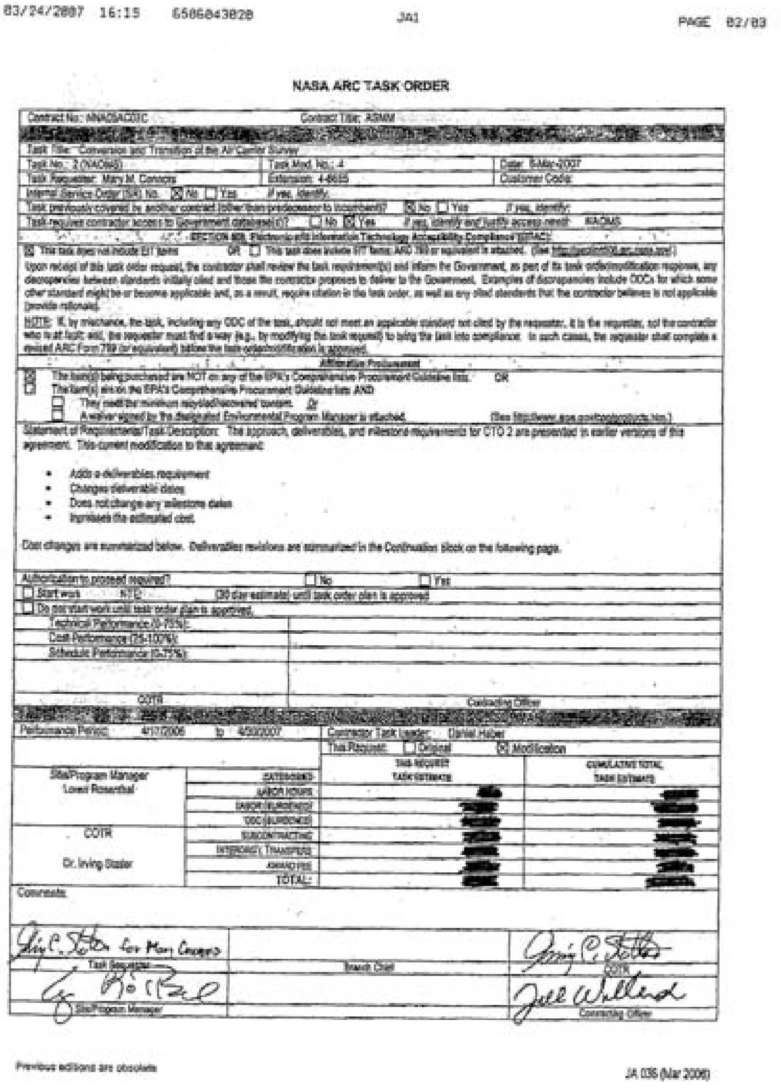
II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

CLAUSE NUMBER	DATE	TITLE
1852.203-70	JUN 2001	DISPLAY OF INSPECTOR GENERAL HOTLINE POSTERS
1852.204-76	JUL 2002	SECURITY REQUIREMENTS FOR UNCLASSIFIED INFORMATION TECHNOLOGY RESOURCES (INSERT: "30 DAYS" IN PARAGRAPH (c))
1852.216-75	DEC 1988	PAYMENT OF FIXED FEE
1852.219-74	SEP 1990	USE OF RURAL AREA SMALL BUSINESSES
1852.219-75	MAY 1999	SMALL BUSINESS SUBCONTRACTING REPORTING
1852.219-76	JUL 1997	NASA 8 PERCENT GOAL
1852.227-14	AUG 1997	RIGHTS IN DATA -- GENERAL
1852.227-17	AUG 1997	RIGHTS IN DATA -- SPECIAL WORKS
1852.235-70	FEB 2003	CENTER FOR AEROSPACE INFORMATION
1852.245-73	OCT 2003	FINANCIAL REPORTING OF NASA PROPERTY IN THE CUSTODY OF CONTRACTORS (Insert: NASA Ames Research Center, M/S 255-2, Moffett Field, CA 94035-1000)

(END OF CLAUSE)

I.2. OMBUDSMAN (NFS 1852.215-84) (OCT 2003) (ALTERNATE I) (JUN 2000)

(a) An ombudsman has been appointed to hear and facilitate the resolution of concerns from offerors, potential offerors, and contractors during the preaward and postaward



03/24/2007 16:15 6506043020 JA1 PAGE 02/03

NASA ARC TASK ORDER

Contract No.: NNA05AC03C Contract Title: ASMM

[redacted]

Task Title: Conversion and Transition of the Air Carrier Survey

Task No.: 2 (NAOMS)	Task Mod. No.: 4	Date: 6-Mar-2007
Task Requester: Mary M. Connors	Extension: 4-6635	Customer Code:

Internal Service Order (ISO) No. ☒ No ☐ Yes If yes, identify:

Task previously covered by another contract (other than predecessor to incumbent)? ☒ No ☐ Yes If yes, identify:

Task requires contractor access to Government database(s)? ☐ No ☒ Yes If yes, identify and justify access need: NAOMS

SECTION 508, Electronic and Information Technology Accessibility Compliance (EITAC):

☒ This task does not include EIT items OR ☐ This task does include EIT items; ARC 789 or equivalent is attached. (See http://section508.arc.nasa.gov/)

Upon receipt of this task order request, the contractor shall review the task requirement(s) and inform the Government, as part of its task order/modification response, any discrepancies between standards initially cited and those the contractor proposes to deliver to the Government. Examples of discrepancies include ODCs for which some other standard might be or become applicable and, as a result, require citation in the task order, as well as any cited standards that the contractor believes is not applicable (provide rationale).

NOTE: If, by mischance, the task, including any ODC of the task, should not meet an applicable standard not cited by the requester, it is the requester, not the contractor who is at fault; and, the requester must find a way (e.g., by modifying the task request) to bring the task into compliance. In such cases, the requester shall complete a revised ARC Form 789 (or equivalent) before the task order/modification is approved.

Affirmative Procurement

☒ The item(s) being purchased are NOT on any of the EPA's Comprehensive Procurement Guideline lists. OR
☐ The item(s) are on the EPA's Comprehensive Procurement Guideline lists AND
  ☐ They meet the minimum recycled/recovered content. Or
  ☐ A waiver signed by the designated Environmental Program Manager is attached. (See http://www.epa.gov/cpg/products.htm.)

Statement of Requirements/Task Description: The approach, deliverables, and milestone requirements for CTO 2 are presented in earlier versions of this agreement. This current modification to that agreement:

- Adds a deliverables requirement
- Changes deliverable dates
- Does not change any milestone dates
- Increases the estimated cost.

Cost changes are summarized below. Deliverables revisions are summarized in the Continuation block on the following page.

Authorization to proceed required? ☐ No ☐ Yes
☐ Start work NTE (30 day estimate) until task order plan is approved
☐ Do not start work until task order plan is approved.

Technical Performance (0-75%):
Cost Performance (25-100%):
Schedule Performance (0-75%):

COTR Contracting Officer

[redacted]

Performance Period: 4/17/2006 to 4/30/2007 Contractor Task Leader: Daniel Haber

This Request: ☐ Original ☒ Modification

	CATEGORIES	THIS REQUEST TASK ESTIMATE	CUMULATIVE TOTAL TASK ESTIMATE
Site/Program Manager Lowell Rosenthal	LABOR HOURS	[redacted]	[redacted]
	LABOR (BURDENED)	[redacted]	[redacted]
	ODC (BURDENED)	[redacted]	[redacted]
COTR Dr. Irving Statler	SUBCONTRACTING	[redacted]	[redacted]
	INTERAGENCY TRANSFERS	[redacted]	[redacted]
	AWARD FEE	[redacted]	[redacted]
	TOTAL:	[redacted]	[redacted]

Comments:

Irving C. Statler for Mary Connors
Task Requester

Branch Chief

Irving C. Statler
COTR

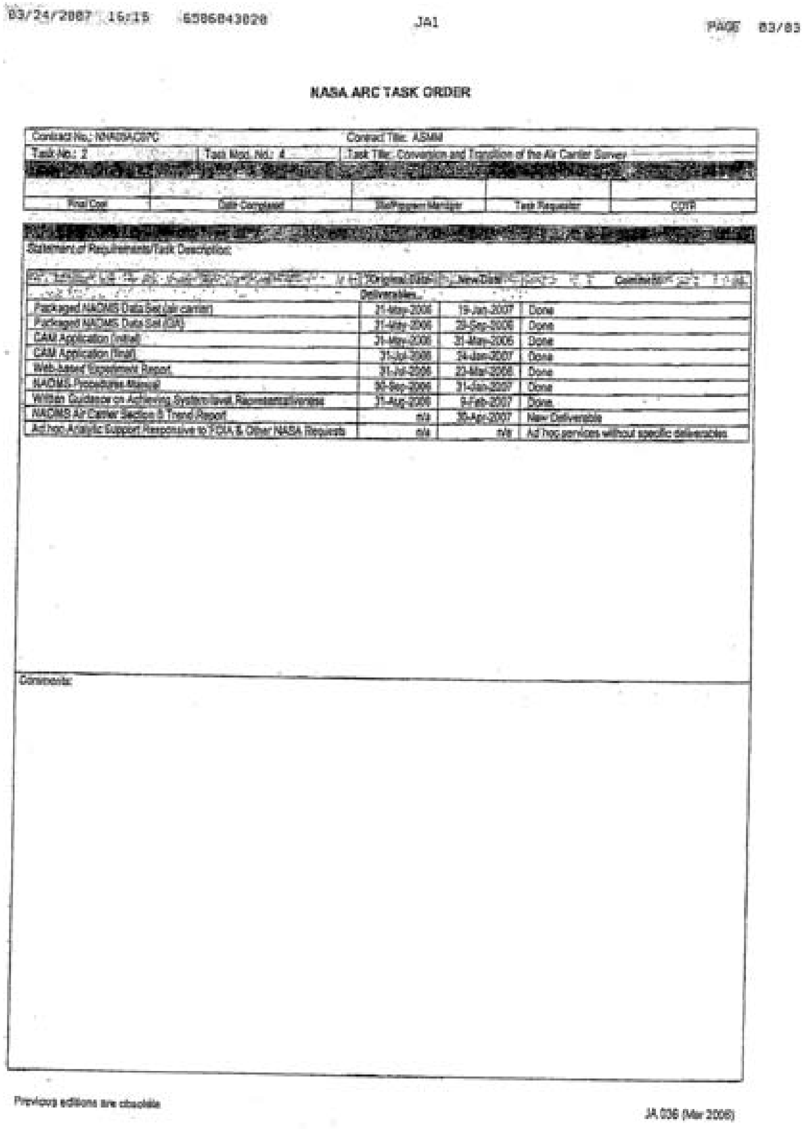
Site/Program Manager

Jill Willard
Contracting Officer

Previous editions are obsolete

JA 036 (Mar 2006)

ENCLOSURE 4



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NASA ARC TASK ORDER

Contract No.: NNA05AC07C		Contract Title: ASMM
Task No.: 2	Task Mod. No.: 4	Task Title: Conversion and Transition of the Air Carrier Survey

[redacted]

Final Cost	Date Completed	SM/Program Manager	Task Requester	COTR

[redacted]

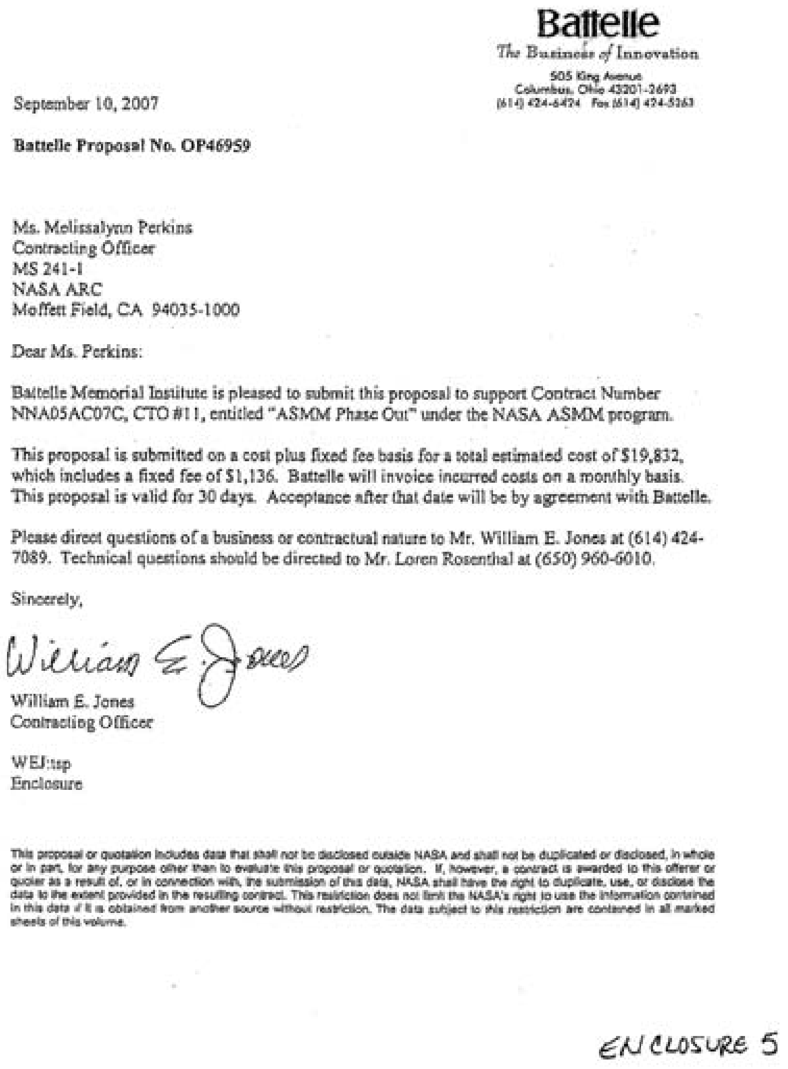
Statement of Requirements/Task Description:

[illegible]	Original Date	New Date	Comments
	Deliverables...		
Packaged NAOMS Data Set (air carrier)	21-May-2006	19-Jan-2007	Done
Packaged NAOMS Data Set (GA)	31-May-2006	29-Sep-2006	Done
CAM Application (initial)	31-May-2006	31-May-2006	Done
CAM Application (final)	31-Jul-2006	24-Jan-2007	Done
Web-based Experiment Report	31-Jul-2006	23-Mar-2006	Done
NAOMS Procedures Manual	30-Sep-2006	31-Jan-2007	Done
Written Guidance on Achieving System-level Representativeness	31-Aug-2006	9-Feb-2007	Done.
NAOMS Air Carrier Section B Trend Report	n/a	30-Apr-2007	New Deliverable
Ad hoc Analytic Support Responsive to FOIA & Other NASA Requests	n/a	n/a	Ad hoc services without specific deliverables

Comments:

Previous editions are obsolete

JA 036 (Mar 2006)



Battelle
The Business of Innovation
505 King Avenue
Columbus, Ohio 43201-2693
(614) 424-6424 Fax (614) 424-5263

September 10, 2007

Battelle Proposal No. OP46959

Ms. Melissalynn Perkins
Contracting Officer
MS 241-1
NASA ARC
Moffett Field, CA 94035-1000

Dear Ms. Perkins:

Battelle Memorial Institute is pleased to submit this proposal to support Contract Number NNA05AC07C, CTO #11, entitled "ASMM *Phase Out*" under the NASA ASMM program.

This proposal is submitted on a cost plus fixed fee basis for a total estimated cost of $19,832, which includes a fixed fee of $1,136. Battelle will invoice incurred costs on a monthly basis. This proposal is valid for 30 days. Acceptance after that date will be by agreement with Battelle.

Please direct questions of a business or contractual nature to Mr. William E. Jones at (614) 424-7089. Technical questions should be directed to Mr. Loren Rosenthal at (650) 960-6010.

Sincerely,

William E. Jones

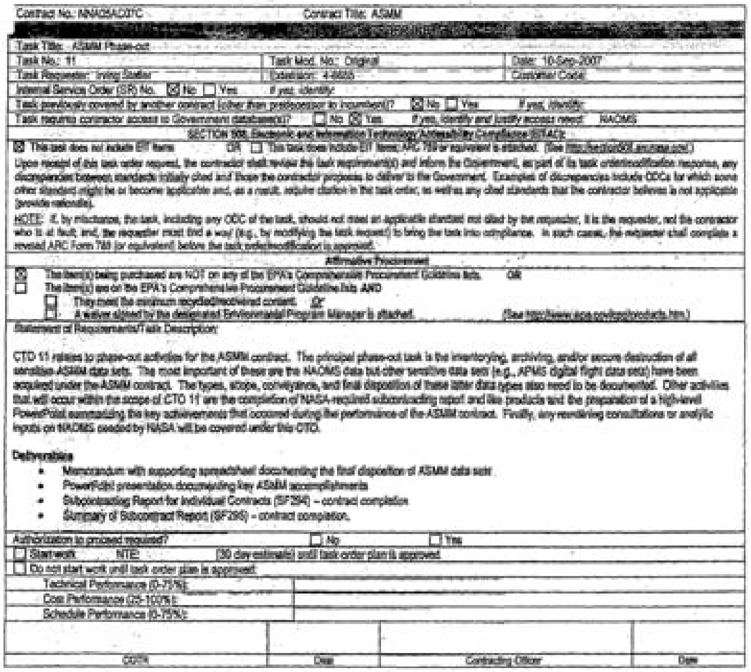
William E. Jones
Contracting Officer

WEJ:tsp
Enclosure

This proposal or quotation includes data that shall not be disclosed outside NASA and shall not be duplicated or disclosed, in whole or in part, for any purpose other than to evaluate this proposal or quotation. If, however, a contract is awarded to this offerer or quoter as a result of, or in connection with, the submission of this data, NASA shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the NASA's right to use the information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in all marked sheets of this volume.

ENCLOSURE 5

NASA ARC TASK ORDER



Contract No.: NNA05AC07C	Contract Title: ASMM	
[redacted]		
Task Title: ASMM Phase-out		
Task No.: 11	Task Mod. No.: Original	Date: 10-Sep-2007
Task Requester: Irving Statler	Extension: 4-6655	Customer Code:

Internal Service Order (ISR) No. ☒ No ☐ Yes If yes, identify:

Task previously covered by another contract (other than predecessor to incumbent)? ☒ No ☐ Yes If yes, identify:

Task requires contractor access to Government database(s)? ☐ No ☒ Yes If yes, identify and justify access need: NAOMS

SECTION 508, Electronic and Information Technology Accessibility Compliance (EITAC):

☒ This task does not include EIT items OR ☐ This task does include EIT items; ARC 789 or equivalent is attached. (See http://section508.arc.nasa.gov/)

Upon receipt of this task order request, the contractor shall review the task requirement(s) and inform the Government, as part of its task order/modification response, any discrepancies between standards initially cited and those the contractor proposes to deliver to the Government. Examples of discrepancies include ODCs for which some other standard might be or become applicable and, as a result, require citation in the task order, as well as any cited standards that the contractor believes is not applicable (provide rationale).

NOTE: If, by mischance, the task, including any ODC of the task, should not meet an applicable standard not cited by the requester, it is the requester, not the contractor who is at fault; and, the requester must find a way (e.g., by modifying the task request) to bring the task into compliance. In such cases, the requester shall complete a revised ARC Form 789 (or equivalent) before the task order/modification is approved.

Affirmative Procurement

☒ The item(s) being purchased are NOT on any of the EPA's Comprehensive Procurement Guideline lists. OR

☐ The item(s) are on the EPA's Comprehensive Procurement Guideline lists AND

- ☐ They meet the minimum recycled/recovered content. Or
- ☐ A waiver signed by the designated Environmental Program Manager is attached. (See http://www.epa.gov/cpg/products.htm)

Statement of Requirements/Task Description:

CTO 11 relates to phase-out activities for the ASMM contract. The principal phase-out task is the inventorying, archiving, and/or secure destruction of all sensitive ASMM data sets. The most important of these are the NAOMS data but other sensitive data sets (e.g., APMS digital flight data sets) have been acquired under the ASMM contract. The types, scope, conveyance, and final disposition of these latter data types also need to be documented. Other activities that will occur within the scope of CTO 11 are the completion of NASA-required subcontracting report and like products and the preparation of a high-level PowerPoint summarizing the key achievements that occurred during the performance of the ASMM contract. Finally, any remaining consultations or analytic inputs on NAOMS needed by NASA will be covered under this CTO.

Deliverables

- Memorandum with supporting spreadsheet documenting the final disposition of ASMM data sets
- PowerPoint presentation documenting key ASMM accomplishments
- Subcontracting Report for Individual Contracts (SF294) – contract completion
- Summary of Subcontract Report (SF295) – contract completion.

Authorization to proceed required? ☐ No ☐ Yes

☐ Start work NTE: (30 day estimate) until task order plan is approved.

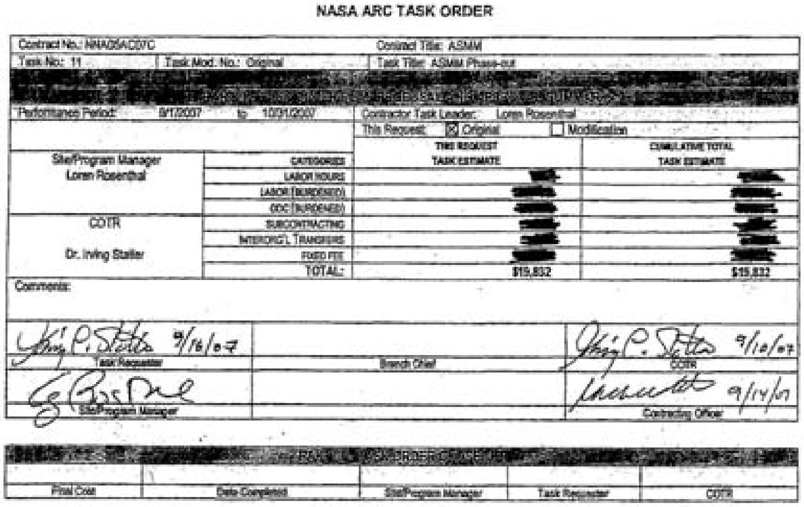
☐ Do not start work until task order plan is approved.

Technical Performance (0-75%):	
Cost Performance (25-100%):	
Schedule Performance (0-75%):	

COTR	Date	Contracting Officer	Date

Previous editions are obsolete

JA 036 (Mar 2006)



NASA ARC TASK ORDER

Contract No.: NNA05AC07C
Contract Title: ASMM
Task No.: 11
Task Mod. No.: Original
Task Title: ASMM Phase-out

[illegible]

Performance Period: 9/1/2007 to 10/31/2007
Contractor Task Leader: Loren Rosenthal
This Request: ☒ Original ☐ Modification

Site/Program Manager Loren Rosenthal	CATEGORIES	THIS REQUEST TASK ESTIMATE	CUMULATIVE TOTAL TASK ESTIMATE
	LABOR HOURS	[redacted]	[redacted]
	LABOR (BURDENED)	[redacted]	[redacted]
COTR Dr. Irving Statler	ODC (BURDENED)	[redacted]	[redacted]
	SUBCONTRACTING	[redacted]	[redacted]
	INTERORG'L TRANSFERS	[redacted]	[redacted]
	FIXED FEE	[redacted]	[redacted]
	TOTAL:	$15,832	$15,832

Comments:

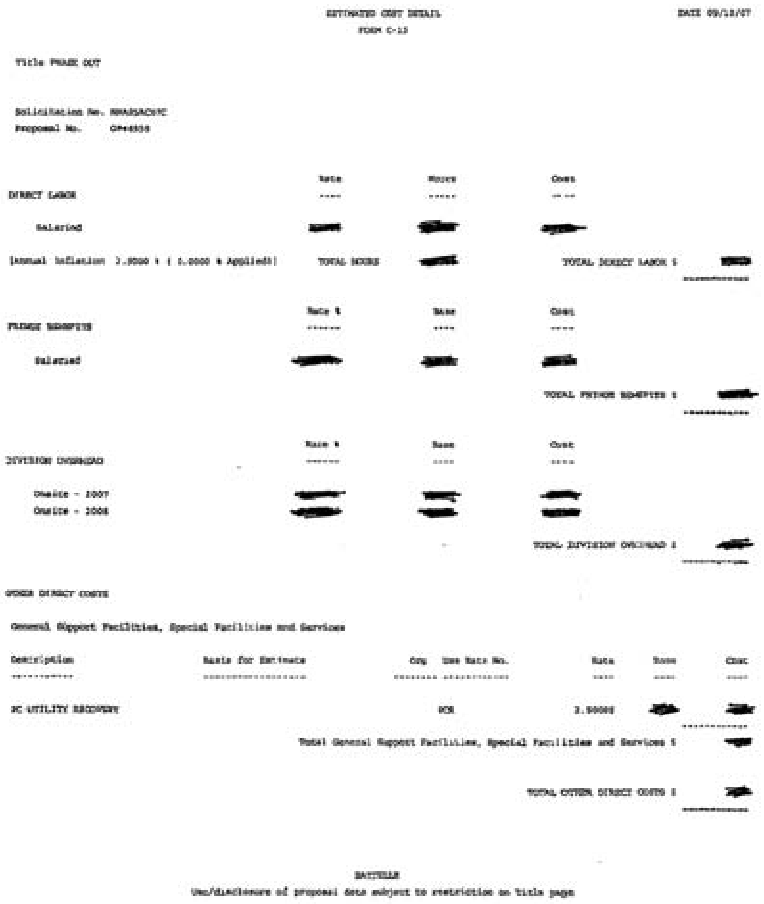
Irving P. Statler 9/16/07		Irving P. Statler 9/10/07
Task Requester	Branch Chief	COTR
		9/14/07
Site/Program Manager		Contracting Officer

[illegible]

Final Cost	Date Completed	Site/Program Manager	Task Requester	COTR

Previous editions are obsolete

JA 036 (Mar 2006)



ESTIMATED COST DETAIL
FORM C-13

DATE 09/13/07

Title PHASE OUT

Solicitation No. [illegible]
Proposal No. [illegible]

DIRECT LABOR	Rate	Hours	Cost
Salaried	[redacted]	[redacted]	[redacted]
(Annual Inflation 3.0000 % (0.0000 % Applied))	TOTAL HOURS	[redacted]	

TOTAL DIRECT LABOR $ [redacted]

FRINGE BENEFITS	Rate %	Base	Cost
Salaried	[redacted]	[redacted]	[redacted]

TOTAL FRINGE BENEFITS $ [redacted]

DIVISION OVERHEAD	Rate %	Base	Cost
Onsite - 2007	[redacted]	[redacted]	[redacted]
Onsite - 2008	[redacted]	[redacted]	[redacted]

TOTAL DIVISION OVERHEAD $ [redacted]

OTHER DIRECT COSTS

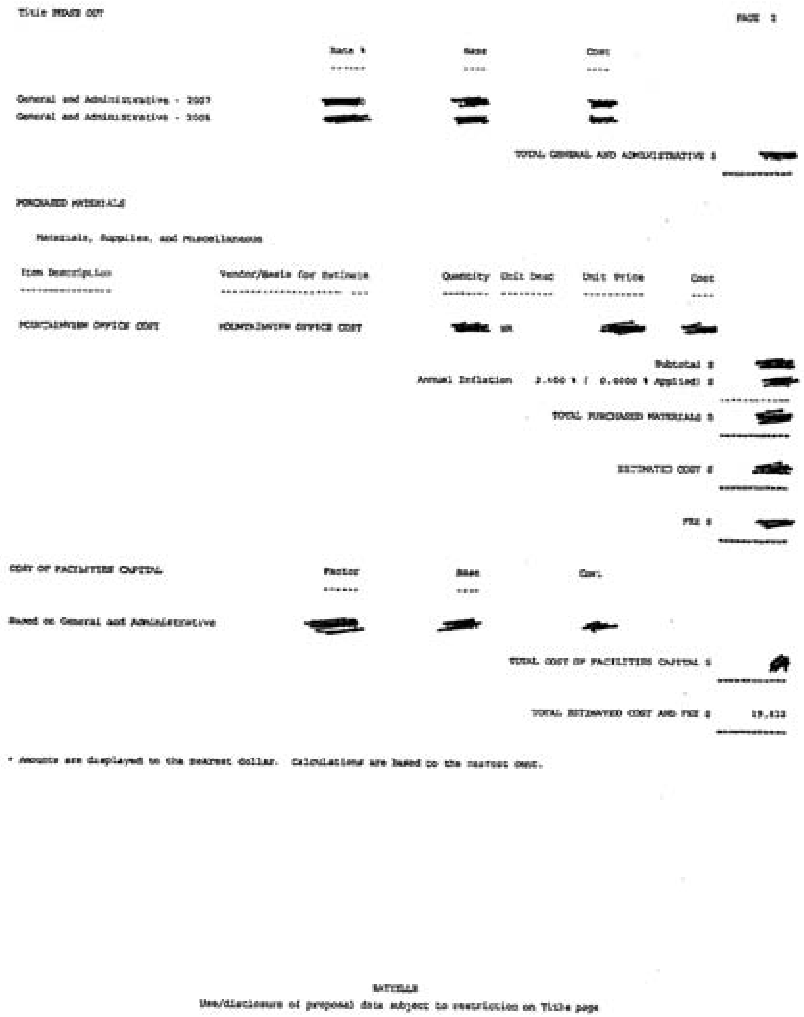
General Support Facilities, Special Facilities and Services

Description	Basis for Estimate	Org	Use Rate No.	Rate	Base	Cost
PC UTILITY RECOVERY			PCR	2.9000%	[redacted]	[redacted]

Total General Support Facilities, Special Facilities and Services $ [redacted]

TOTAL OTHER DIRECT COSTS $ [redacted]

BATTELLE
Use/disclosure of proposal data subject to restriction on title page



Title PHASE OUT

PAGE 3

	Rate %	Base	Cost
General and Administrative - 2007	[redacted]	[redacted]	[redacted]
General and Administrative - 2008	[redacted]	[redacted]	[redacted]

TOTAL GENERAL AND ADMINISTRATIVE $ [redacted]

PURCHASED MATERIALS

Materials, Supplies, and Miscellaneous

Item Description	Vendor/Basis for Estimate	Quantity	Unit Desc	Unit Price	Cost
MOUNTAINVIEW OFFICE COST	MOUNTAINVIEW OFFICE COST	[redacted]	HR	[redacted]	[redacted]

Subtotal $ [redacted]

Annual Inflation 2.450 % (0.0000 % Applied) $ [redacted]

TOTAL PURCHASED MATERIALS $ [redacted]

ESTIMATED COST $ [redacted]

FEE $ [redacted]

COST OF FACILITIES CAPITAL	Factor	Base	Cost
Based on General and Administrative	[redacted]	[redacted]	[redacted]

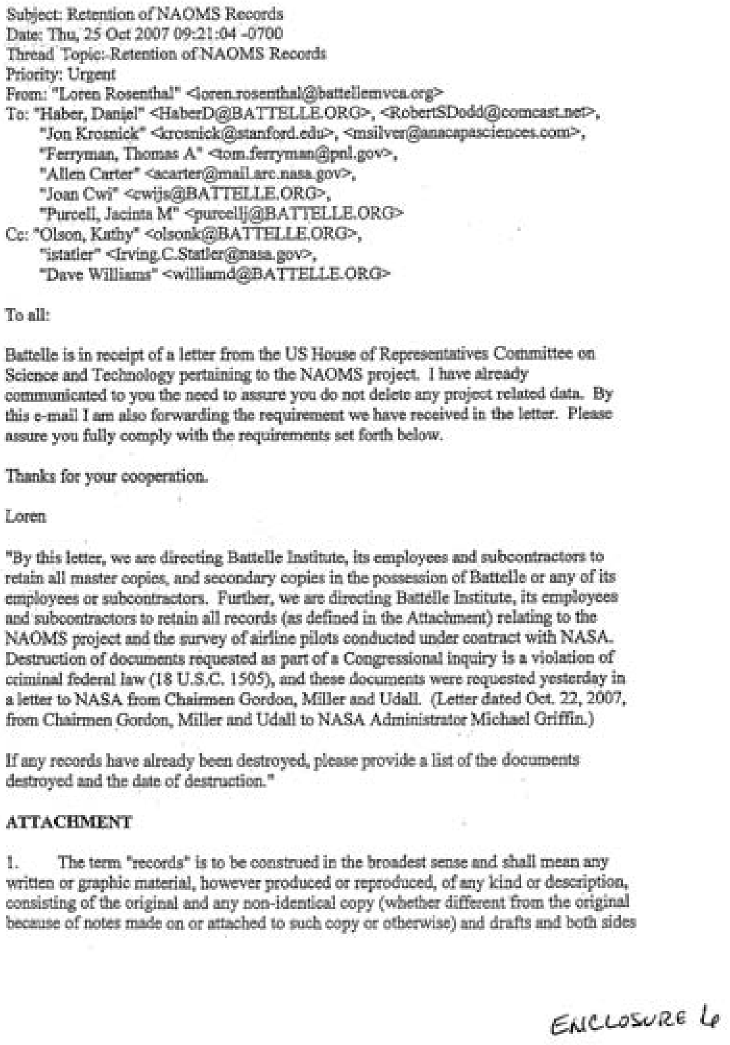
TOTAL COST OF FACILITIES CAPITAL $ [redacted]

TOTAL ESTIMATED COST AND FEE $ 19,832

* Amounts are displayed to the nearest dollar. Calculations are based to the nearest cent.

BATTELLE

Use/disclosure of proposal data subject to restriction on Title page



Subject: Retention of NAOMS Records
Date: Thu, 25 Oct 2007 09:21:04 -0700
Thread Topic: Retention of NAOMS Records
Priority: Urgent
From: "Loren Rosenthal" <loren.rosenthal@battellemvca.org>
To: "Haber, Daniel" <HaberD@BATTELLE.ORG>, <RobertSDodd@comcast.net>,
"Jon Krosnick" <krosnick@stanford.edu>, <msilver@anacapasciences.com>,
"Ferryman, Thomas A" <tom.ferryman@pnl.gov>,
"Allen Carter" <acarter@mail.arc.nasa.gov>,
"Joan Cwi" <cwijs@BATTELLE.ORG>,
"Purcell, Jacinta M" <purcellj@BATTELLE.ORG>
Cc: "Olson, Kathy" <olsonk@BATTELLE.ORG>,
"istatler" <Irving.C.Statler@nasa.gov>,
"Dave Williams" <williamd@BATTELLE.ORG>

To all:

Battelle is in receipt of a letter from the US House of Representatives Committee on Science and Technology pertaining to the NAOMS project. I have already communicated to you the need to assure you do not delete any project related data. By this e-mail I am also forwarding the requirement we have received in the letter. Please assure you fully comply with the requirements set forth below.

Thanks for your cooperation.

Loren

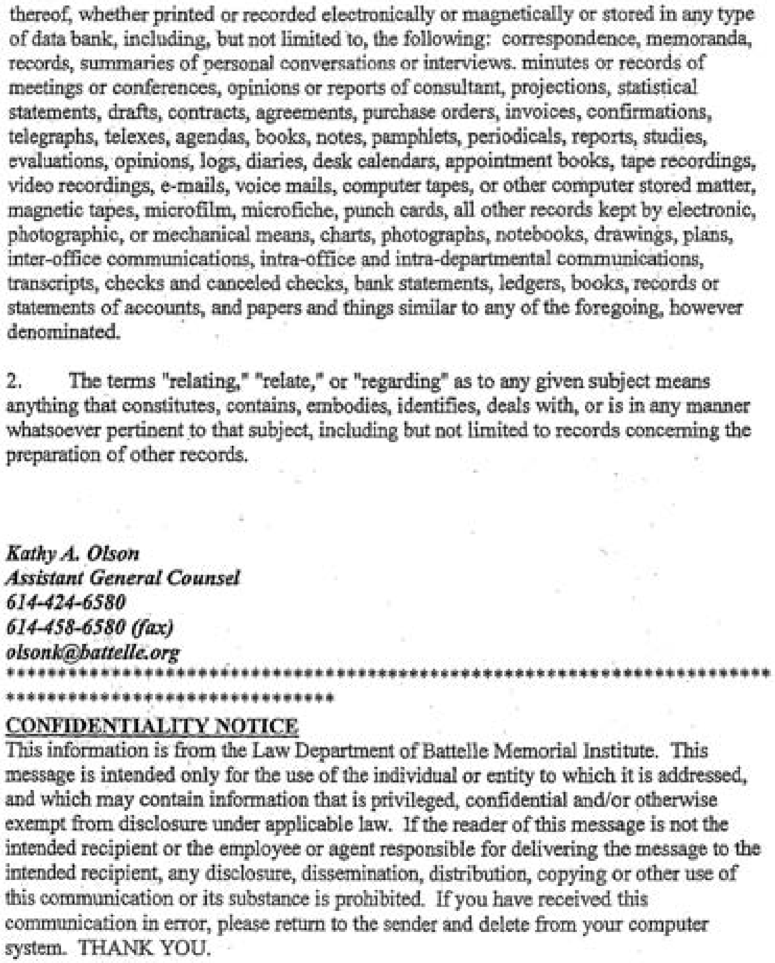
"By this letter, we are directing Battelle Institute, its employees and subcontractors to retain all master copies, and secondary copies in the possession of Battelle or any of its employees or subcontractors. Further, we are directing Battelle Institute, its employees and subcontractors to retain all records (as defined in the Attachment) relating to the NAOMS project and the survey of airline pilots conducted under contract with NASA. Destruction of documents requested as part of a Congressional inquiry is a violation of criminal federal law (18 U.S.C. 1505), and these documents were requested yesterday in a letter to NASA from Chairmen Gordon, Miller and Udall. (Letter dated Oct. 22, 2007, from Chairmen Gordon, Miller and Udall to NASA Administrator Michael Griffin.)

If any records have already been destroyed, please provide a list of the documents destroyed and the date of destruction."

ATTACHMENT

1. The term "records" is to be construed in the broadest sense and shall mean any written or graphic material, however produced or reproduced, of any kind or description, consisting of the original and any non-identical copy (whether different from the original because of notes made on or attached to such copy or otherwise) and drafts and both sides

ENCLOSURE 6



thereof, whether printed or recorded electronically or magnetically or stored in any type of data bank, including, but not limited to, the following: correspondence, memoranda, records, summaries of personal conversations or interviews. minutes or records of meetings or conferences, opinions or reports of consultant, projections, statistical statements, drafts, contracts, agreements, purchase orders, invoices, confirmations, telegraphs, telexes, agendas, books, notes, pamphlets, periodicals, reports, studies, evaluations, opinions, logs, diaries, desk calendars, appointment books, tape recordings, video recordings, e-mails, voice mails, computer tapes, or other computer stored matter, magnetic tapes, microfilm, microfiche, punch cards, all other records kept by electronic, photographic, or mechanical means, charts, photographs, notebooks, drawings, plans, inter-office communications, intra-office and intra-departmental communications, transcripts, checks and canceled checks, bank statements, ledgers, books, records or statements of accounts, and papers and things similar to any of the foregoing, however denominated.

2. The terms "relating," "relate," or "regarding" as to any given subject means anything that constitutes, contains, embodies, identifies, deals with, or is in any manner whatsoever pertinent to that subject, including but not limited to records concerning the preparation of other records.

Kathy A. Olson
Assistant General Counsel
614-424-6580
614-458-6580 (fax)
olsonk@battelle.org
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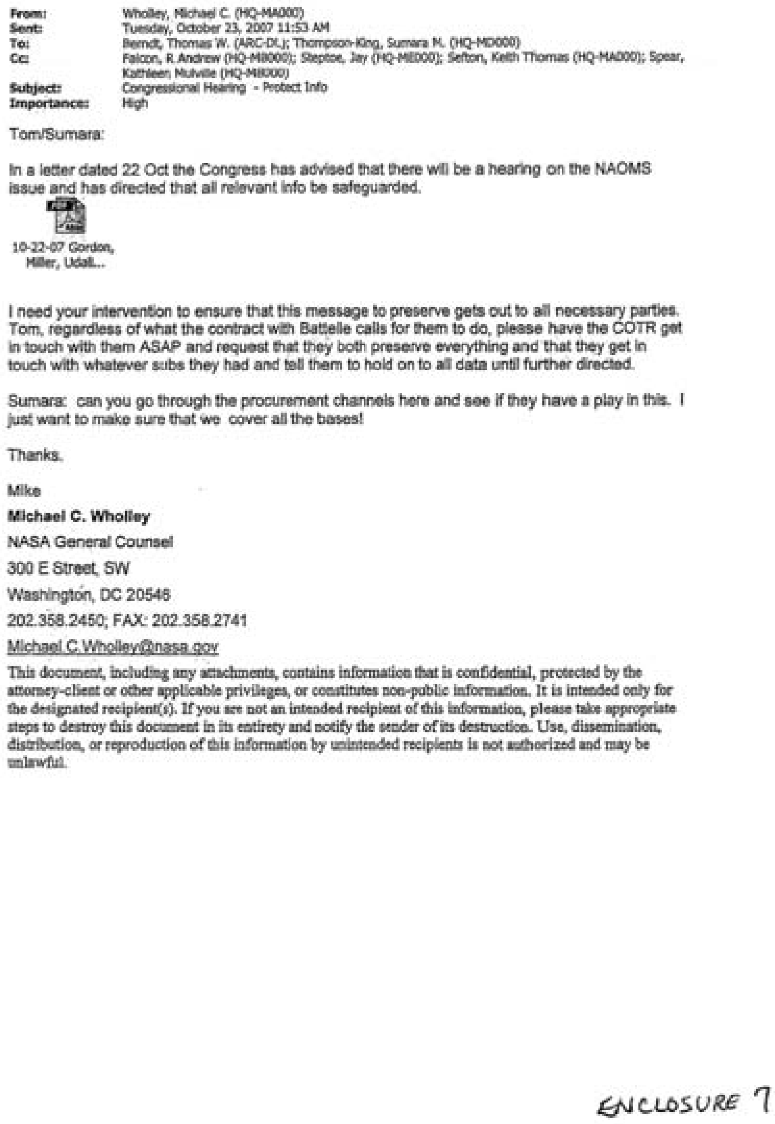

From: Wholley, Michael C. (HQ-MA000)
Sent: Tuesday, October 23, 2007 11:53 AM
To: Berndt, Thomas W. (ARC-DL); Thompson-King, Sumara M. (HQ-MD000)
Cc: Falcon, R Andrew (HQ-MB000); Steptoe, Jay (HQ-ME000); Sefton, Keith Thomas (HQ-MA000); Spear, Kathleen Mulvile (HQ-MB000)
Subject: Congressional Hearing - Protect Info
Importance: High

Tom/Sumara:

In a letter dated 22 Oct the Congress has advised that there will be a hearing on the NAOMS issue and has directed that all relevant info be safeguarded.

10-22-07 Gordon, Miller, Udall...

I need your intervention to ensure that this message to preserve gets out to all necessary parties. Tom, regardless of what the contract with Battelle calls for them to do, please have the COTR get in touch with them ASAP and request that they both preserve everything and that they get in touch with whatever subs they had and tell them to hold on to all data until further directed.

Sumara: can you go through the procurement channels here and see if they have a play in this. I just want to make sure that we cover all the bases!

Thanks.

Mike

Michael C. Wholley
NASA General Counsel
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202.358.2450; FAX: 202.358.2741
Michael.C.Wholley@nasa.gov

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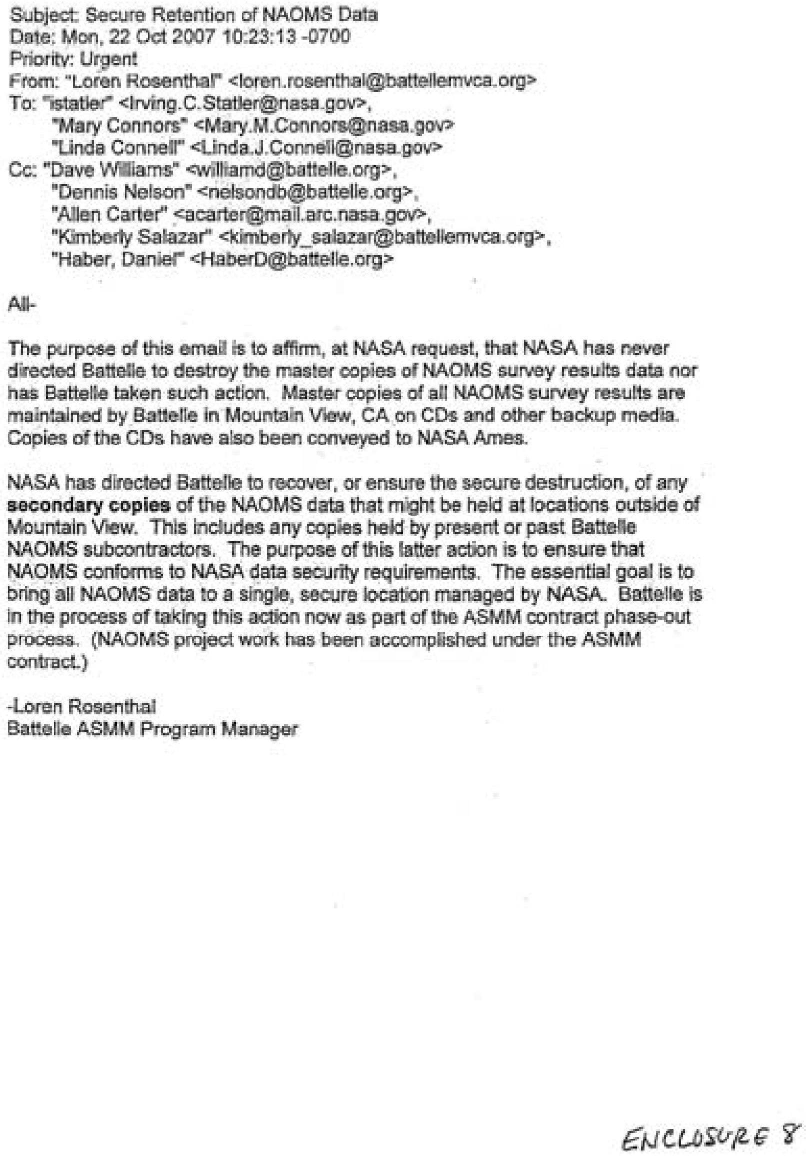
ENCLOSURE 7



Subject: Secure Retention of NAOMS Data
Date: Mon, 22 Oct 2007 10:23:13 -0700
Priority: Urgent
From: "Loren Rosenthal" <loren.rosenthal@battellemvca.org>
To: "istatler" <Irving.C.Statler@nasa.gov>,
"Mary Connors" <Mary.M.Connors@nasa.gov>
"Linda Connell" <Linda.J.Connell@nasa.gov>
Cc: "Dave Williams" <williamd@battelle.org>,
"Dennis Nelson" <nelsondb@battelle.org>,
"Allen Carter" <acarter@mail.arc.nasa.gov>,
"Kimberly Salazar" <kimberly_salazar@battellemvca.org>,
"Haber, Daniel" <HaberD@battelle.org>

All-

The purpose of this email is to affirm, at NASA request, that NASA has never directed Battelle to destroy the master copies of NAOMS survey results data nor has Battelle taken such action. Master copies of all NAOMS survey results are maintained by Battelle in Mountain View, CA on CDs and other backup media. Copies of the CDs have also been conveyed to NASA Ames.

NASA has directed Battelle to recover, or ensure the secure destruction, of any **secondary copies** of the NAOMS data that might be held at locations outside of Mountain View. This includes any copies held by present or past Battelle NAOMS subcontractors. The purpose of this latter action is to ensure that NAOMS conforms to NASA data security requirements. The essential goal is to bring all NAOMS data to a single, secure location managed by NASA. Battelle is in the process of taking this action now as part of the ASMM contract phase-out process. (NAOMS project work has been accomplished under the ASMM contract.)

-Loren Rosenthal
Battelle ASMM Program Manager

ENCLOSURE 8